TECHNOLOGY DEPT.

THE INSTITUTE OF PETROLEUM REVIEW

PUBLIC LIBRARY
JAN 4 1955
DETROIT

December 1954

ONE SHILLING AND SIXPENCE

Published by The Institute of Petroleum
26 Portland Place, London, W.1

Additives

Monsanto oil additives specially designed to meet the needs of the oil industry include :—

SANTOPOUR B *Pour point depressant*

SANTOLUBE 398, 394C *Motor oil inhibitors*

SANTOLUBE 203B *Motor oil detergent*

SANTOLUBE 204, 205, 210, 388, 382
Medium and heavy duty combinations

SANTOLUBE AR *Rust inhibitor for turbine oils*

SANTOLENE F *Sludge inhibitor for fuel oils*

(Santopour and Santolube are Registered Trade Marks)

MONSANTO

MONSANTO CHEMICALS LIMITED,
Victoria Station House, Victoria Street, London, S.W.1.

In association with Monsanto Chemical Company, St. Louis, U.S.A. Monsanto Canada Ltd., Montreal. Monsanto Chemicals (Australia) Ltd., Melbourne. Monsanto Chemicals of India Ltd., Bombay. Representatives in the world's principal trading

Solving the problem of solving your problem

You probably know that an electronic computer will solve the most complex problems in engineering research and design with only a fraction of the expenditure in manpower and time otherwise required. But do you know that these enormous savings in man-hours of calculation are now available to you?

All you need do is put your problem to the Elliott Electronic Computing Service, where Elliott mathematicians with years of experience in high-speed computing techniques will solve it for you, on Elliott Digital Computers—the most advanced electronic computers of their type.

Data processing; the tabulation of mathematical functions; the design of lenses; the evaluation of trajectories; the calculation of strains in structures; these are typical of the varied computing problems which have already been solved for industry by the Elliott Electronic Computing Service.

CONSULT

ELLIOTT

FOR ELECTRONIC COMPUTING

ELLIOTT BROTHERS (LONDON) LTD., COMPUTING MACHINE DIVISION
ELSTREE WAY, BOREHAMWOOD, HERTS. TELEPHONE : ELSTREE 2040

THE INSTITUTE OF PETROLEUM

REVIEW

Hon. Editor: E. B. EVANS, M.Sc., PH.D., F.R.I.C.

Hon. Associate Editor: D. L. SAMUEL, B.Sc., A.R.I.C.

Editor: GEORGE SELL

Vol. 8, No. 96 **December 1954**

Contents

THIS DETERGENT AGE 235
By *J. O. M. Alexander*
AROUND THE BRANCHES 237
COUNCIL COMMENTARY 240
FAWLEY REFINERY 241
IRANIAN OIL SETTLEMENT 242
HOW BIG IS A SHIP? PART III 243
By *J. Anthony Hind*
THE ROYAL DUTCH/SHELL GROUP 246
TRADE LITERATURE 246
THE ASSAM OIL INDUSTRY 248
FOURTH WORLD PETROLEUM CONGRESS 249
PERSONAL NOTES 250
NOTES OF THE MONTH 251
BOOKS AND FILMS 254
FORTHCOMING MEETINGS 255
AUTHOR INDEX 256
SUBJECT INDEX 256

Price 1/6 **Annual Subscription 15/-, post free**

Published monthly by
THE INSTITUTE OF PETROLEUM
26 Portland Place, London, W.1
'Phone: LANgham 2250

Printed by
Richmond Hill Printing Works Ltd., Bournemouth

CRAIG

COMPREHENSIVE SERVICE

*

REFINERY DESIGN AND CONSTRUCTION

•

ATMOSPHERIC AND
VACUUM DISTILLATION UNITS

•

COMBINED DISTILLATION,
CRACKING, REFORMING AND
VAPOUR PHASE TREATING UNITS

•

PARAFFIN WAX EXTRACTION,
REFINING AND MOULDING

•

GASOLINE RECOVERY
AND STABILISATION UNITS

•

HEAT EXCHANGE EQUIPMENT OF ALL TYPES

•

FRACTIONATING COLUMNS
AND TUBE STILLS

A.F. CRAIG & COMPANY LTD

CALEDONIA ENGINEERING WORKS

PAISLEY SCOTLAND

London Office: 727, Salisbury House, London Wall, E.C.2.

Telephone: NATIONAL 3964

C/5

PARANOX 448

a new and improved Rust Inhibitor Additive

Paranox 448 developed in the Esso Laboratories is now available in this country.
Added to turbine, transformer and other industrial circulating oils, Paranox 448 effectively controls the rusting of metal parts operating in the presence of water or sea water.
Our Technical Representative will be glad to call and give you full details of how Paranox 448 and other Paramins can meet your specific lubrication problems. This service places you under no obligation whatsoever.

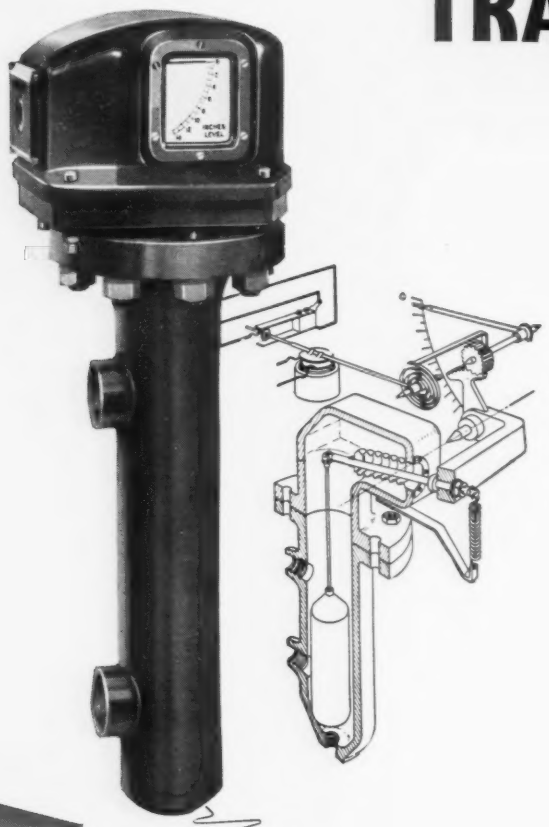
PARAMINS TRADE MARK

Paraflow PDX Pour Point Depressant, Paratone Viscosity Index Improver, Paranox Range of Detergent Inhibitors, Paratac Stringiness Agent, Vistone B Oiliness Agent, Paradyne Fuel Improvers.

ESSO PETROLEUM COMPANY, LTD., 36 QUEEN ANNE'S GATE, LONDON, S.W.1

EVERSHED

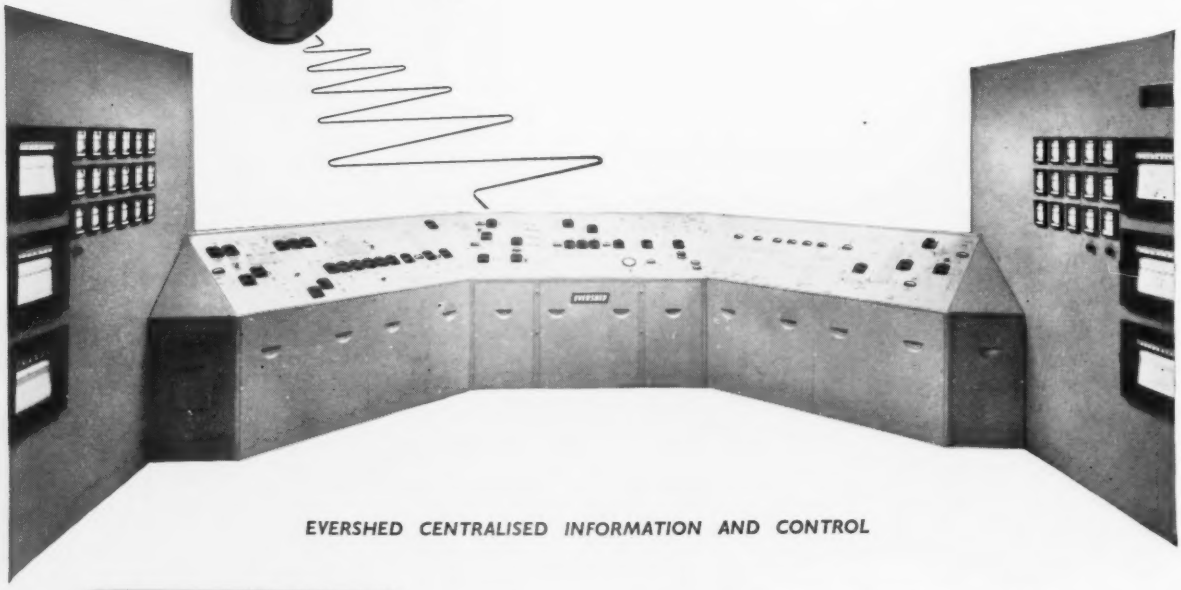
DISPLACER LEVEL TRANSMITTER



At the new Anglo-Iranian Refinery at Aden, flow, pressure, level and temperature in two 60,000 B.P.S.D. Crude Distillation Units are automatically controlled from two Central Control Desks.

Levels are controlled by means of the Evershed Displacer Level Transmitter. These transmitters are designed to detect the level of liquid, or the interface between two liquids in a pressure vessel, and to transmit the information to the required central point.

The instrument is sturdily built, reliable and intrinsically safe. *For full details of the Evershed Displacer Level Transmitter send for Publication PA* 266/1.



EVERSHED CENTRALISED INFORMATION AND CONTROL

EVERSHED

EVERSHED AND VIGNOLES LIMITED

ACTON LANE WORKS · CHISWICK · LONDON · W4

Telephone: Chiswick 3670 · Cables: Megger, London · Telegrams: Megger, Chisk, London

6/159

1,000,000 tons of storage

London's oil reservoir for over 50 years

This great independent petroleum installation, serving the needs of all the oil companies operating in the country, both large and small, receives into its storage tanks petroleum products from many parts of the world. From there the oil goes out in a constant flow by water, road and rail to supply greater London and the neighbouring Counties.

LONDON AND THAMES HAVEN OIL WHARVES LIMITED

3 ST. HELENS PLACE, LONDON, EC3 · Tel: AVEnue 6444
THAMES HAVEN INSTALLATION · Tel: Stanford-Le-Hope 2232

Night-light time

WHILE MOST OF the world sleeps, Anglo-Iranian's refineries and distribution organisation are working for the benefit of mankind.

The child's night-light is a small example. The world demand for energy has doubled in the last twenty years and oil supplies two thirds of this.

Anglo-Iranian makes an impressive contribution. Over thirty-two million tons of oil were produced last year. There are refineries in eight countries and one of the world's largest privately-owned tanker fleets to carry the oil. The company's marketing organisation stretches from Iceland to Tasmania.

Half a century of enterprise and continuous progress have put Anglo-Iranian among the world's largest and most progressive oil companies.

THE BP SHIELD IS THE SYMBOL OF THE WORLD-WIDE ORGANISATION OF

Anglo-Iranian Oil Company
LIMITED

STRUCTURES IN STEEL

We Specialise in
ALL TYPES OF STRUCTURES
Required for
Oil Production and Refining

ALSO
'KELVIN' *all iron* and 'MAINSTEEL' PALISADING
and All Types of FENCING
for HOME and OVERSEAS

A. & J. MAIN & COMPANY LIMITED

LONDON OFFICE
VINCENT HOUSE, VINCENT SQUARE, S.W.1
Telephones: Victoria 8375/6/7/8 *Telegrams:* Kelvin Sowest, London

WORKS AND REGISTERED OFFICE
CLYDESDALE IRONWORKS, POSSILPARK GLASGOW, C.2
Telephone: Possil 8381 *Telegrams:* Kelvin, Glasgow

CALCUTTA: Post Box 36, 16 NETAJI SUBHAS ROAD
also NAIROBI and CHITTAGONG

Price of Shield, including postage: 26/10d. Size: 7"×6"

Catalogues sent on request

PIGGOTT BROTHERS & COMPANY LIMITED

- *Makers of Tropical Kit and Equipment*
- *And all classes of Canvas Goods*

SUPPLIERS OF THE INSTITUTE CREST, AND ALL OTHER SCHOOL, REGIMENTAL AND COLLEGE COATS OF ARMS

220-226, BISHOPSGATE, LONDON, E.C.2.

THE MASTERPIECE IN OILS

Used by **most** British motorists
Approved by **every** British car maker

WAKEFIELD Castrol MOTOR OIL

NEW—

FLAME-PROOFED PRESSURE STEAM CLEANER

Utilizes dry steam from the factory line with a detergent at 150 lbs. per sq. inch pressure

• NO FUMES •

WICKHAM INDUSTRIAL EQUIPMENT LIMITED
Dashwood House, Old Broad St., London, E.C.2
Tel.: London Wall 1191 2 3

ASTM—IP PETROLEUM MEASUREMENT TABLES

Prepared jointly by the Institute of Petroleum and the American Society for Testing Materials, these standardized tables will be of incalculable benefit to all concerned with the measurement of petroleum products.

The Tables are available in three editions, viz:

American (U.S. units of measurement)	Price 63*s.* ($8.75)
British (Imperial units of measurement)	Price 50*s.* ($7.00)
Metric (Metric units of measurement)	Price 55*s.* ($7.70)

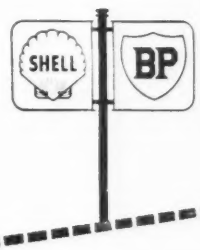
and are obtainable from

American Society for Testing Materials
1916 Race Street
Philadelphia, Pa., U.S.A.

Institute of Petroleum
26 Portland Place
London, W.1

A Good Sign

This is the sign of a new standard in service to motorists. By training garage staffs in the latest methods, the SHELL AND BP SERVICE aims to raise the general level of courtesy and efficiency throughout the country. Help us by always asking for service when you drive in.

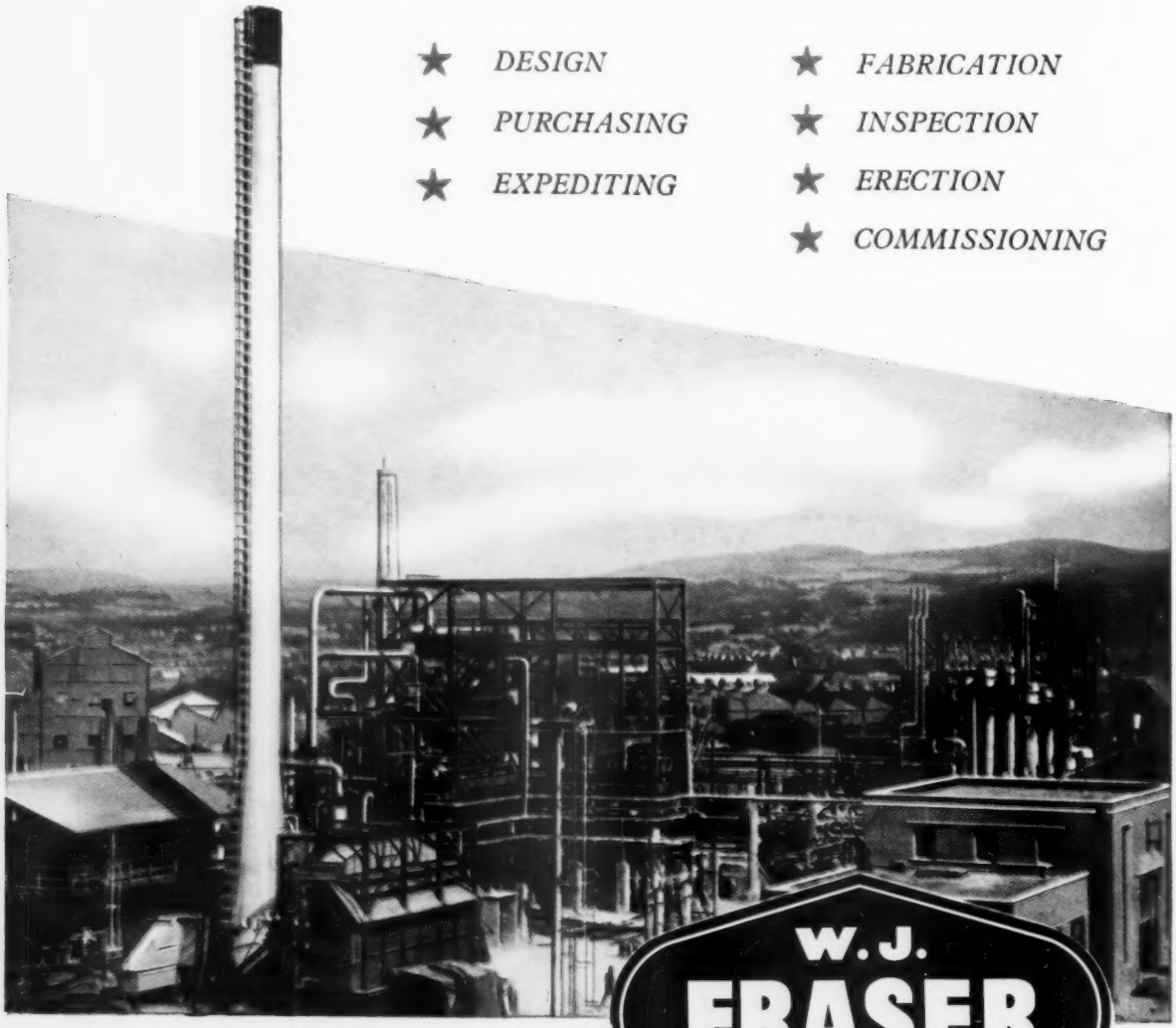


It identifies the products which are marketed by Shell-Mex and B.P. Ltd. in England, Wales and Northern Ireland, by Scottish Oils & Shell-Mex Ltd. in Scotland and by Irish Shell Ltd. in the Republic of Ireland. Behind all these companies lie the vast resources of the Shell, Anglo-Iranian and Eagle Groups.

Autofining

The Anglo-Iranian patent process for catalytic desulphurisation of petroleum distillates is available under licence from Frasers. Frasers also offer a Complete Engineering Service comprising:—

- ★ *DESIGN*
- ★ *PURCHASING*
- ★ *EXPEDITING*
- ★ *FABRICATION*
- ★ *INSPECTION*
- ★ *ERECTION*
- ★ *COMMISSIONING*



Photograph by courtesy of Anglo-Iranian Oil Co. Ltd.

W. J. FRASER & CO. LTD., Harold Hill, Romford, Essex.
Works at Monk Bretton, near Barnsley, S. Yorks.

W. J. FRASER & CO. LTD.

TAS/FS417

This Detergent Age*

By J. O. M. ALEXANDER †

The more I think of the title of this paper, "This Detergent Age", the more I like it. Some people call this "The Atomic Age". It may be, but atomic developments have not been of noticeable benefit to mankind so far, whereas I hope to show that we owe a lot to detergents. In fact in the U.K. we are particularly indebted to them, for our standard of living as far as some foods are concerned is directly related to the increase in output of the new detergents.

Before the second world war the world, by and large, did all its washing with soap, although the textile trade had started to use some newer washing materials. Fat shortage during the war, and service needs for washing in salt or brackish water, allied to the inherent advantages of some non-soap detergents, started these materials on the upward path from which they have never yet looked back.

In 1944 the U.S.A. used 1.8 million tons of soap and 56,000 tons of new detergents. I do not suppose the world production of good new detergents was much higher. Certainly there was very little in the U.K. and only some poor quality ones in Germany.

Growth continued and it is interesting to see how F. H. Braybrook of Shell Chemicals reviewed the future when he read a paper to the London Section of the Society of Chemical Industry.‡ He said that certain authorities estimated that the U.S. production of synthetic detergents would reach 325,000 tons in 1952-5.

In fact the American figures have far surpassed any expectations held in 1948, and in the third quarter of 1953 U.S. synthetic detergent sales were running at a rate of 920;000 tons per year, while soap had dropped to 800,000 tons per year. This is quite a revolution: in ten years soaps have come down from 1.8 million to 800,000 while their new competitors are up from 56,000 to 920,000.

In practice the revolution is even greater than the figures show because one ton of the better new detergents does, under certain conditions, as much washing as nearly 1½ tons of an equivalent soap. Some people are sceptical when one says this, but housewives, who are good judges of value, are happy to pay even slightly more for a packet of new detergent powder containing 8 oz than they do for a packet of soap powder of about 12 oz and of similar volume.

So in America well over half, probably about 60 per cent on a performance basis, of the washing materials bought today belong to the class of new detergents.

In the United Kingdom 1953 was also a landmark because on a performance, or washing value for money, basis new detergents outstripped soaps in what we call the package detergent business (all the powders and flakes, etc., packed in cartons), obtaining towards the end of the year 55 to 60 per cent of this market. As a proportion of the total washing material market the new detergents have reached about 45 per cent on the same performance basis. Our experience in the U.K. is, therefore, closely parallel to that of the U.S.A., but we lag behind them by about two years.

The revolution has come about largely because the new detergents are now of such high quality as to be preferred by the user to traditional materials. They have, however, brought other very great benefits in their wake.

The Effect of Detergents on the World Supply of Fats and Oils

If all the new detergents used today in the United Kingdom alone had to be replaced by soap, an extra 100,000 tons of oils and fats would be needed. This is no inconsiderable tonnage, it is about 7 per cent of the total oils and fats, including butter, available to the U.K. today. It is nearly 14 per cent of the oil content of all the butter, margarine, and lard we eat, and it represents half the amount of oils and fats used for soap production.

If we wanted this oil today we would probably have to pay dollars for it, and in the long term somewhere in the world nearly three-quarters of a million acres of land, not at present used for any crop, would have to be put down to oil or oilseed crops. The East African groundnut scheme showed us how easy in contemplation, but how appallingly difficult in execution, such a project can be.

The conclusion that one must reach, and I believe the proper officials at the Ministry would agree with me, is that but for the large saving in fats made by the new detergents the recent derationing of edible fats would have been impossible.

Before we leave the economic aspect let us consider the world situation. It would probably take about one million tons of oils and fats per year to replace the present global output of new detergents. This would need the staggering total of about seven million acres of land to grow it, or a threefold increase in the world's annual whale catch—and the whales won't stand it, or a 100 per cent increase in the American tallow and grease output —and I don't think even the Americans could eat the extra amount of meat which that would represent.

All this simply for soap, at a time when we in Western Europe and our friends in North America are consuming over 60 lb of fats each per year, and eating most of it, while untold millions of people in Asia have only 10 lb each—about what you and I are still using each year as soap in spite of the new detergents. I think it is unnecessary for me to go further. The good that the present revolution in the detergent industry has brought about is obvious, and I think further progress in the future is assured.

The Development of the Detergents Industry

Now what are these new detergents, where do the raw materials for them come from, and what is the story behind it all?

The story of detergents is lost in antiquity; we have been making soap in the U.K. on an industrial basis since the 14th Century, and in this decade, for the first time, we are seeing a reduction in soap output. The story of new detergents also starts quite a long time ago—about 100 years ago when the sulphated fatty oils, Turkey Red oil was the first, were discovered.

These materials did not really wash, although some of them had detergent properties, but they were good wetting agents, and moreover they wetted in acid solution and in hard water. A considerable use for them was, therefore, built up in the textile and leather trades, acid bath dyeing, and fat liquoring, etc.

It was not, however, until the last decade before the second world war that any attempt was made to develop and sell on the retail market detergents based upon these industrial wetting agents. The products which then started to appear were light duty detergents made by sulphating fatty alcohols or fatty

*Paper read to the Institute of Petroleum, London Branch, 17 February 1954.

†Thomas Hedley and Co. Ltd.

‡Braybrook, F. H., *Chem. & Ind.*, 1948, p. 404.

monoglycerides. The fat used was usually cocoanut oil and the product was relatively expensive and aimed at the luxury end of the market. They did, however, achieve some success in America, Germany, and the U.K. because they were efficient and had some undoubted advantages in hard water.

Before I go any further I think I had better explain what I mean by light and heavy duty detergents. Light duty products are those of use only when dirt is not firmly attached to the article being washed, for example, in the washing of woollens, nylons, silk and rayon underclothes, or washing up. Heavy duty products are those needed for well-soiled articles, shirts, overalls, etc., in fact what is known as the weekly wash. Both classes include soaps and some of the new detergents.

The pre-war products were definitely light-duty only and they did not fare very well when the war came. They were based on fat, and fats were scarce in Europe even though these products used much less fat than an equivalent soap.

The emphasis turned upon being able to wash using no fat at all, and the problem was differently solved in different parts of the world. In Germany they were short of petroleum so they turned to materials that could be made from coal in the Fischer-Tropsch process. They first used true synthetic soaps made from fatty acids produced by oxidation of the "gatsch" or wax produced by the Fischer-Tropsch plants. The yield on the operation was, however, not good and they turned to the mersolates, alkyl sulphonates derived from Fischer-Tropsch paraffins. These saw Germany through the war, but they never produced a heavy duty detergent satisfactory by peacetime standards.

In the U.K. we relied largely on soap, rationed of course during the war, but one petroleum-based product which Shell made from refinery wax and marketed as Teepol was of importance. Chemically this was a secondary alkyl sulphate and it formed the basis, and still does, of some light duty products which have found acceptance on the retail market. We all tried desperately hard in the immediate post-war years to make this type of raw material into a satisfactory heavy duty detergent for the retail market. We were not successful, however, owing to some inherent qualities of these materials.

The Production of Heavy Duty Detergents

I might explain at this stage why I emphasize the heavy duty detergent. It is because the market is six times the size of that for light duty products. It is thus the cornerstone upon which any detergent business must depend.

In America things happened rather differently. They were not so short of oils and fats. They were in any case spending more time and money on detergent research than any other country in the world. They also had a relative abundance of raw materials upon which to work. It is not surprising, therefore, but still extremely creditable, that in the U.S.A. was discovered and developed the basis upon which the phenomenal expansion of the new detergents has taken place.

The chosen active base material was alkyl benzene. This is a material particularly well suited for the petroleum chemical industry to make, and it was of great assistance in starting that after the war a lot of alkylation capacity was available. It had been built for making lower alkylates for adding to aviation petrol.

Alkyl benzenes were made partly from kerosine and benzene, and partly from a propylene polymer (four molecules of propylene) and benzene. The latter has in the long run proved the most popular.

Detergent manufacturers buy these alkyl benzenes, sulphonate them, and then neutralize. One then has quite a good detergent. This may be surprising and it is interesting to note how basically similar the alkyl benzene sulphonate (A.B.S.) molecule is to an ordinary soap. This similarity is all the more interesting when one remembers that the former is derived from oil and coal, while the latter, or similar bodies, stem from the oil palm, the groundnut, the sheep, or the whale. The sulphonated alkyl benzene was *quite* a good detergent. A normal formulation with minor amounts of other ingredients and quite a lot of inert sodium sulphate will produce a good light duty product.

It was, however, the discovery that it was possible to build A.B.S. so that it became a heavy duty detergent that really opened the door to the future. This discovery was made during the war largely as a result of research work done by Procter and Gamble in America. The chosen substance for the building operation is a complex phosphate, the one usually used being sodium tripolyphosphate (T.P.P.). Why such a mixture of A.B.S. and T.P.P. should perform in the very excellent way it does is still a mystery. There are many theories but, so far, no thorough explanation.

Explainable or not, the demand for complex phosphates which are present in heavy duty detergents at up to 50 per cent by weight, threw a heavy load on the industry which it is only just meeting. It was a new problem, since inorganic phosphates had previously been made only in very large tonnages with high impurities for fertilizers, or in small quantities for use in food. This new usage took some time to meet, but the rising demand curve is now tending to flatten out. In the U.S.A., T.P.P. production rose in six years from under 50,000 to over 400,000 tons per annum. In the U.K., major expansion in output is being made and this will lessen our dependence on continental suppliers.

The problem of formulating a good heavy duty detergent does not, however, end with A.B.S. and T.P.P. In order to ensure that while retaining its advantages over soap the new detergent does not suffer from any disadvantages, various other materials are added in small proportions for particular purposes.

Sodium carboxymethyl cellulose, usually known as C.M.C., is used to prevent soil, once loosened and freed from the article being washed, being deposited on it again. Dyestuffs with a special fluorescent effect are used, one almost universally, to give extra whiteness to washed articles. For products to be used in washing at the boil it is useful to incorporate a substance which liberates oxygen, as this gives increased powers of stain removal. Sodium perborate is the substance involved.

You will thus see that formulation is not an easy matter; nor, lest my oversimplified references to mixing have misled you, is manufacture. A complex continuously-operating plant, made of stainless steel, allied to large tank and silo storage systems and mechanical handling facilities, is necessary to sulphonate and neutralize the A.B. and add the other ingredients. At this stage moreover the product is still in liquid or paste form. To achieve the granular powder with which you are familiar it is necessary to spray the paste into the top of a large, high tower into which a lot of very hot air is also introduced. As the droplets of paste fall to the bottom of the tower the water evaporates from them and a powder results. This powder must then be separated from the air stream, screened to remove oversize or very small particles, tested, and packed. Such is the output to which chemical engineering research has raised these units that only the highest-speed packing machinery can, within reasonable limits of space, keep up with them. Currently, even the largest cartons are being packed at 240 per minute, and new machines with higher speeds are in the offing.

★ ★ ★

THE CHEMICAL AND PETROLEUM ENGINEERING EXHIBITION

Arrangements have now been completed to hold for the first time in the United Kingdom a joint exhibition of chemical plant and petroleum equipment. This exhibition will be known as The Chemical and Petroleum Engineering Exhibition and will take place in the Grand Hall, Olympia, London, in June 1958: it will be organized by F. W. Bridges & Sons Ltd, and sponsored jointly by the British Chemical Plant Manufacturers Association and the Council of British Manufacturers of Petroleum Equipment.

Around the Branches

FAWLEY, LONDON, NORTHERN, PERSIAN GULF, SCOTTISH, SOUTH EASTERN, SOUTH WALES, STANLOW, TRINIDAD

Fawley Branch

Supper Dance

One hundred guests attended the opening event of the 1954-55 season of the Fawley Branch on 10 September, when a supper dance was held for members and their friends at the Esso Pavilion, Holbury.

In his welcoming address, S. A. Berridge, secretary and treasurer of the Fawley Branch, mentioned the fact that the success of the previous supper dance in 1953 had prompted the Committee to commence the present season with a similar event, and it was hoped that this would become an annual affair.

Two members of the Fawley Branch and their wives enjoying a social evening on the occasion of the Branch supper dance. From left to right: S. A. Berridge, secretary and treasurer of the Branch, Mrs S. A. Berridge, Mrs P. G. Layzell, and P. G. Layzell, chief chemist at the Fawley Refinery.

Dancing was to music by Phil Kahn and his orchestra, and this was interspersed with a number of "not so common" party games arranged by the MC, Jimmy James, in which the whole assembly joined.

The buffet supper was particularly appreciated, especially as it followed 15 minutes of "old-fashioned dancing".

Competitions were judged very ably by Dr A. W. Pearce, who is assistant refinery manager of the Esso Petroleum Company and a member of the Fawley Branch Committee.

Everyone thought it a great pity when the orchestra played "Auld Lang Syne", and all agreed that it had been a very enjoyable evening.

Diesel Engine Research

At a meeting of the Branch on 24 September, Professor Frank Morton gave a talk on "Recent Developments in Diesel Engine Research".

Professor Morton began by saying that he was pleased that the subject chosen was a specialized one. It was of interest to chemical engineers by reason of the methods used for sampling gases from the cylinder of a diesel engine. The work he was to describe was carried out under a ten years fellowship at Birmingham University for research on the combustion of hydrocarbons and he wanted to show how this research project developed and how the work fitted into the larger picture of diesel engine development.

Professor Morton stated that fuel injected at 1800 p.s.i. into a diesel engine cylinder ignited after striking a hot wall and the delay period between the beginning of injection and ignition comprised a physical part and a chemical part. Burning of the accumulated fuel was uncontrolled immediately after ignition. Combustion of the fuel injected subsequent to the period of uncontrolled burning was termed controlled burning; and after-burning occurred when fuel injection had ceased. Uncontrolled burning resulted in a very rapid increase in pressure which gave rise to knock, and so it was desirable to reduce the ignition delay period. Thus, fuels or additives which caused rapid ignition and knock in a spark ignition engine would reduce knock in a diesel engine. Many additives were tested but the concentrations required were uneconomically large. They were more effective in the vapour than in the liquid phase. As these additives did not increase the efficiency of the engine, *i.e.* lead to more miles per gallon, there was not the same economic advantage as in the case of petrol additives. Reduction of the delay period made starting easier and the engine ran more smoothly and with less smoke on maximum load. Thus, additives to increase the cetane number were apparently not the answer.

At the South-eastern Branch Dance.
(Left), R. E. Clements, Noel and Mrs Grey, Mrs Clements; (centre), H. E. F. Pracy, Mrs G. H. Thornley, Mrs Pracy, and G. H. Thornley, and (right) George Sell (who took the rest of the photos), G. M. Davies, and G. H. Thornley.

At the South-eastern Branch Dance.
(Left); W. H. Davies, Ron Leach and Mrs Davies; (centre); Mrs Lloyd, Miss Knowles, D. Fraser and F. Lloyd, and (right), Mrs and Mr D. J. Lewis and Mr and Mrs J. A. Green.

The physical part of the delay period could be reduced to a minimum, said Professor Morton, and there remained the chemical part. In order to investigate this, it was necessary to sample the complex mixture ahead of the flame. At 2000 r.p.m. the delay period was only one thousandth of a second or two degrees crank angle. The greater effectiveness of additives in the vapour phase could be due to pre-ignition changes or a surface effect (but surface tension was shown to be relatively unimportant).

The first apparatus used to take samples through a hole in the combustion chamber wall was operated hydraulically. The amount taken at each operation of the valve was small, it was taken from the wall of the chamber at one point only, and the exact timing was uncertain. An improved sampler was operated by a electromagnetic hammer and it could be pushed into the combustion chamber to take samples at different points. It obtained a 5 ml sample at each operation and sufficient gas was collected in five minutes running of the engine.

From analyses of the gas samples collected, evidence of reactions preceding ignition was obtained and by rather involved calculations it was possible to obtain the pressure and temperature conditions. These showed that cool flame reactions could precede combustion of the fuel in a hot flame reaction. Equipment employing a window in the combustion chamber, photomultiplier, and oscillograph, was successfully used after overcoming many difficulties.

Professor Morton showed the flame photographs obtained with this equipment, members at the meeting having the privilege of being the first to see them. These photographs clearly showed the existence of cool flame reactions preceding ignition and the association of these reactions with diesel knock. These reactions could occur before injection and did not involve the new charge. They also occurred on the scavenge stroke and even after two scavenge strokes. Confirmation of their existence came from the high aldehyde contents of gas samples taken when they were occurring.

In the interesting discussion which followed the talk, Professor Morton answered many pertinent questions which showed

Members of the IP Branches Committee at the Kent oil refinery of Anglo-Iranian Oil Co. Ltd.
(Left to right); R. Leach (secretary, London Branch); W. H. Davies (chairman, London Branch); C. Chilvers (IP honorary secretary); J. C. Wood-Mallock (chairman, Northern Branch); G. M. Davies (secretary, Northern Branch); N. W. Grey (chairman, South-eastern Branch); J. V. Jones (Kent Oil Refinery); S. A. Berridge (secretary, Fawley Branch); H. E. F. Pracy (Committee member); A. S. Brooman (secretary, Stanlow Branch); V. Biske (chairman, Stanlow Branch); G. H. Thornley (Committee chairman); J. A. Green (chairman, South Wales Branch); T. Edwards (secretary, Birmingham Students Section); P. J. King (chairman, Birmingham Students Section); D. J. Lewis (secretary, South Wales Branch); Dr G. H. Smith (Committee); J. R. Moore (secretary, South-eastern Branch).

Photo by G. Sell

the keen interest aroused by his lucid and absorbing account of an outstanding contribution to diesel engine research.

J. R. Baddiley proposed a vote of thanks to Professor Morton for an exceedingly interesting lecture.

South-eastern Branch

The Annual Dance of the South-eastern Branch, held this year on 22 October at the Tudor House, Bearsted, was voted an unqualified success by all present. Prior to the dance a dinner was held for visiting Branch members which was presided over by the Branch chairman, Noel W. Grey. The guests included C. S. Cleverly (general manager of Anglo-Iranian's Kent Oil Refinery) and Mrs. Cleverly, Col. S. J. M. Auld (president of the Institute), C. Chilvers (IP honorary secretary) and Mrs Chilvers, G. H. Thornley (chairman of IP Branches Committee) and Mrs Thornley, members of the Branches Committee and their ladies, D. A. Hough (IP general secretary) and Mrs Hough, G. Sell (IP editor) and Mrs Sell.

Mr Grey, in a commendably short speech at the dinner, expressed the welcome of the Branch, first to Col. Auld "that distinguished soldier, engineer, and gentleman", the President of the Institute, and to those guests who had honoured them by coming from so far to be with them.

Dancing followed immediately at the conclusion of the dinner and, with F. A. Maliphant as MC, continued unabated until well after midnight. The general organization of the dinner and dance was in the capable hands of J. R. Moore, Branch secretary, and F. Maliphant, to whom much of the success was due for this as well as for the previous entertainment of the IP Branches Committee.

Branches Committee Entertainment

Earlier in the day the Branches Committee had met in the Administration Building at Kent Oil Refinery and in the morning had taken the opportunity of a tour of the 80,000-b.d. refinery on the Isle of Grain. With J. V. (Diver) Jones as their guide an interesting and instructive time was enjoyed by the party. Lunch was taken at the Cat and Cracker Hotel, Grain, on the invitation of C. S. Cleverly, general manager of Kent Oil Refinery, and the directors of Anglo-Iranian Oil Co. Ltd. Originally known as the Cock Hotel, the owners state that it was renamed "in deference to its mighty neighbour, the Kent Oil Refinery", but its sign depicts the feline form of cat and the explosion type of cracker. However, the food and drink were excellent.

Simultaneously, the ladies accompanying the members of the Committee had spent the morning in the town of Rochester, under the guidance of Mesdames Grey, Moore, Maliphant and Carter. They visited many places of interest, including the Cathedral and the market, and it was reported that in the latter place trade was much increased by their visit. In the afternoon they were taken by coach for a drive through the leafy lanes of Kent, the garden county of England. In spite of inclement weather, they expressed themselves well pleased with their entertainment, which included lunch and tea provided by courtesy of the directors of Elliott Bros. (London) Ltd.

Persian Gulf Branch—Bahrain Sub-Area

The September meeting of the Bahrain Sub-Area of the Persian Gulf Branch was held in Awali on 6 September 1954. The speaker at the meeting, which was attended by 50 members and guests, was C. E. Davis, manager of the Producing and Development Department of the Bahrain Petroleum Co. Ltd. The subject of his talk was "Some Recollections of 32 Years of Exploration".

Mr Davis began exploring for oil in Ecuador in 1922 and since then his work has taken him to many other parts of the world. Affiliated companies of the Caltex Group have drilled in Argentina, Ecuador, New Guinea, Colombia, Peru, Trinidad, Venezuela, and Australia, while another affiliate has recently

At the South-eastern Branch Dance

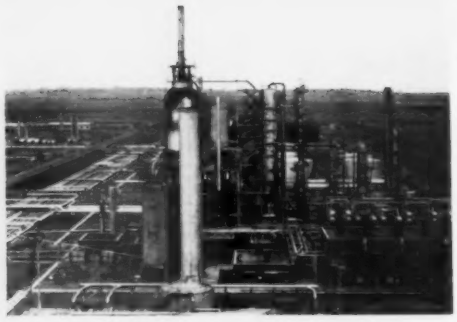
Anthony Grey, Miss Dorothy Bramble, Mr and Mrs Noel Grey, Peter Grey, and Miss Ella Gregson.

Mrs D. A. Hough, Col S. J. M. Auld, Mrs and Mr C. S. Cleverly, and D. A. Hough.

C. Hopwood, R. Brown, Mrs J. R. Moore, Mrs Brown, J. R. Moore, and Mrs Fielder.

Mrs Noel Grey, Mrs and Mr F. A. Maliphant, Mrs and Mr S. A. Berridge.

Mrs and Mr C. Chilvers, J. R. and Mrs Moore, Mrs G. Sell.



When the IP Branches visited the Kent oil refinery they ascended (by lift) to the top of the distillation unit. Here H. E. F. Pracy and G. H. Thornley discuss matters while Noel Grey points out features of the surrounding countryside to S. A. Berridge. These included the cat cracker seen on the right.

become interested in the oil possibilities of Turkey, North Africa, and the Paris basin.

Mr Davis said that Caltex first started work in Indonesia in 1924, but with little result. In 1925 geological work was done in Borneo but no permanent arrangement was made with the Government. In 1935 Shell, Stanvac, and Caltex obtained a joint concession in Dutch New Guinea and oil was soon produced there at 16,000 barrels per day.

Although Caltex was granted a large concession in Sumatra in 1935, no serious drilling was possible till 1945 owing to the Japanese occupation. Oil was eventually struck in 1949 and since then developments have continued steadily.

A coloured sound film called "Minjak Tanah" (earth oil) was shown by Mr Davis and the audience saw in vivid fashion how a great Indonesian national resource was developed in spite of such natural difficulties as a rainfall of 100 inches per year.

After a very interesting discussion following the talk, L. E. Machin, who was shortly to leave Bahrain, handed over the Chair to W. H. Cotter who presented the retiring Chairman with an illuminated address signed by a number of Bahrain Branch members. Mr Machin, in his reply, stressed the great importance of the Institute and its members in the development of the natural resources of Bahrain.

Aerial Mapping

The October meeting of the Bahrain Sub-area was held in Awali on 2 October 1954. The speaker was George B. Thompson and his subject "Aerial Mapping of Bahrain".

Members and their guests had a most enjoyable and instructive evening, for Mr Thompson has been associated with map making in Bahrain for many years, having taken up the subject first as a hobby soon after he came to the Island.

Map making is no easy task even under ideal conditions and one can visualize the additional difficulties that would be encountered, both with instruments and mapping equipment during the humid months of the Persian Gulf summer. However, patience and persistence together with that invaluable aid, aerial photography, have at last brought success.

The speaker dealt with the types of camera and aircraft desirable for a particular survey in detail. It was a surprise to many that even the "G" factor had to be allowed for in cameras built for aerial survey work. He then went on to describe the many instruments, and their uncanny masters who were able to transfer data from the aerial photographs to make not only plane maps but also contour sheets. This portion of the talk was amplified by a film by Hunting Aerosurveys Ltd. showing the entire process, from an aerial survey of the countryside, through the various transfer process machines, to producing the finished map. A second film taken by the speaker himself from aircraft under varying conditions of flight illustrated the necessity for the aircraft to be stable during survey runs.

At the conclusion of his talk Mr Thompson answered several questions on map making and then concluded by arranging his display material around the theatre for the convenience of those present. The material consisted of maps in various stages of completion; aerial photographs together with the latest map of Bahrain completed from these photographs. This excellent display kept members interested for long after the meeting.

The meeting concluded with a vote of thanks to Mr Thompson proposed by R. B. Bennett.

★ ★ ★

Council Commentary

At the Council Meeting held on 13 October there were a number of points for discussion which will be of considerable interest to members.

One item was the meeting of the International Standardization Organization which is to be held in London next June. Our own Standardization Committee will be vitally concerned with this meeting and F. L. Garton, its chairman, has already had in mind for some time the extent to which his energetic band of collaborators can contribute to this meeting. The members of the Co-ordinating Research Council will also be present and an evening meeting followed by a small dinner and a meeting of the Engine Tests of Lubricants Panel the next day is the initial suggestion.

It was reported that the Petroleum Gases Panel had prepared a paper on the testing of liquefied petroleum gases to be read at a Symposium held at St. Louis on 27-28 September. Council noted this activity with approval especially as the paper will be read at a meeting attended by members of ASTM Committees D-2 and D-3, the Natural Gasoline Association of America, and the California Natural Gasoline Association.

Our contacts with the French Bureau de Normalization du Pétrole are proceeding very satisfactorily and M. Plet-Beaupré has been invited to join the Standardization Committee.

Members will also be pleased to learn that the Institute of Petroleum will be represented on the Government Committee on Maritime Pollution by E. LeQ. Herbert. This will bring the Institute officially into contact with a problem which is of world-wide importance.

Finally, we are sure that all members will be pleased to know that G. H. Coxon and C. Chilvers have agreed to act for a further period as Honorary Treasurer and Honorary Secretary, respectively.

Fawley Refinery, Southampton

One of Britain's New Oil Communities

In the past eight years the refining capacity of Britain has increased from 3,500,000 tons in 1948 to nearly 29,000,000 tons in 1954, an increase marked by the expansion of existing refinery installations and the growth of new oil communities throughout the country. One of these new oil communities is centred on the Esso refinery at Fawley, for although there has been a refinery at Fawley since 1921, the immense expansion project which was completed in 1951 created what is essentially a new refinery.

It is now three years since the new Fawley refinery was opened and there has been time for both the people and the refinery to consolidate and progress, and to make plans for the future.

Photos by courtesy of Esso Petroleum Co. Ltd.

The ancient parish church of Fawley, now reconstructed and recently re-dedicated.

Changes in the landscape at Fawley, such as the outline of the newly-installed sulphur producing plants, mark the progress which has been made. At the time of the acute world shortage of sulphur it was suggested by H. M. Government that advantage should be taken of the indigenous source of sulphur present in the high sulphur Middle East crudes processed at oil refineries. As a result, a hydrodesulphurizing plant was installed at Fawley to produce hydrogen sulphide from the crude, and a sulphur recovery plant was set up to convert this to 99.5 per cent pure rock sulphur. This is taken in molten form to sulphur bays where it cools to the familiar solid yellow substance. The output of the sulphur plant is about 14,000 tons a year and this is taken up by the textile industry. Apart from the assistance which this plant could give in the event of a recurring national sulphur crisis, production of sulphur at Fawley is estimated to reduce the country's imports of sulphur—a dollar commodity—by about 4 per cent. These new plants came into operation in 1953.

Progress at the refinery itself has been matched by social progress and every effort has been made to establish amenities for the well-being of the new community at Fawley. The company has taken a great interest, for example, in the restoration of the local parish church, which dates from Norman times, and a service of re-dedication was conducted there three months ago by the Bishop of Winchester.

Future Plans

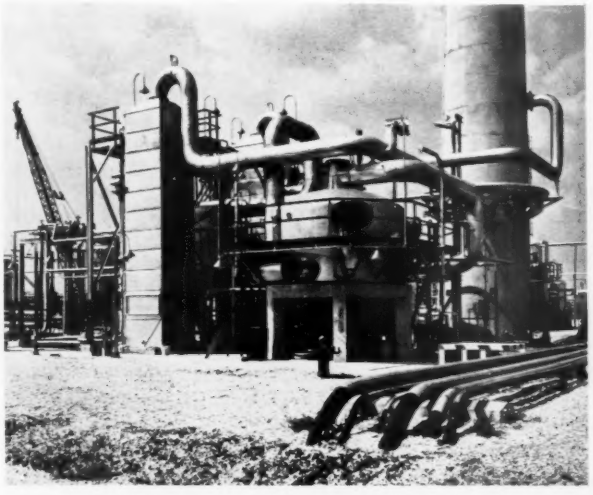
At a recent Press conference G. Noble, O.B.E., a director of the Esso Petroleum Company, spoke of future plans for Fawley and for the Company as a whole. He gave the news that an important new unit, a hydroformer, is to be constructed at Fawley, which will be the first British refinery to have equipment of this kind. The estimated cost of the new plant is £4,000,000.

In announcing this construction project, Mr Noble spoke of the problem of refinery balance. A ton of crude oil produces more or less constant proportions of all products so that if there is a call for greater quantities of fuel oil one inevitably obtains more petrol and middle distillates. With the present level of taxation, said Mr Noble, "we cannot look for much increase in the use of tax-bearing products, and without this we cannot produce more fuel oil, so that in effect the direct tax on petrol and other fuels is an indirect tax on fuel oil".

The projected hydroformer will help to solve this problem. By re-forming molecules in the presence of a catalyst, and in an atmosphere of hydrogen, it will give an extra supply of very high quality petrol which will mean that less of the middle distillate (for which there is a growing demand) will have to be used as feedstock for the cat-cracker.

Mr Noble spoke of the part which the petroleum refining industry is playing in Britain's export drive, and said that the U.K. was now third among the oil refining nations of the world. "At home," said Mr Noble, "we are consuming a little over 20 million tons of petroleum products every year, so that our current surplus available for export is between 8 and 9 million tons. This year, as far as we can estimate, oil exports should realize some £85 million, as against £67 million for coal."

Fawley refinery, as Britain's largest refinery, is, of course, playing a vital part in this important export drive, and Mr



Fawley's sulphur recovery plant—completed in June 1953.

Noble later referred to another field of activity in which Fawley is making a definite contribution, the use of oil by other industries, in particular by railways and power stations.

Finally, Mr Noble spoke of the £10 million which was allocated last year by the Esso Group throughout the world to research activities. Long-term planning was essential in the oil industry, said Mr Noble, and today an attempt was being made to evaluate what would be the position—be it of markets, of crude oil supplies, of tanker requirements, or of the many other phases of oil industry activities—in five years time, or even ten years hence. Plans for progress and expansion at Fawley refinery are an important factor in this overall scheme for future development.

★ ★ ★

Iranian Oil Settlement

In a statement issued recently to stockholders, the chairman of the Anglo-Iranian Oil Co. Ltd., Sir William Fraser, gave the following résumé of the formal Agreement which has been made with Iran with regard to Iranian oil, and of the financial and other arrangements concluded between the eight member companies of the consortium.

The interests of those companies now are: Anglo-Iranian Oil Company, 40 per cent; Gulf Oil Corporation, Socony-Vacuum Oil Company, Inc., Standard Oil Company (New Jersey), Standard Oil Company of California, and The Texas Company each 8 per cent; Royal Dutch-Shell, 14 per cent, and Compagnie Française des Pétroles, 6 per cent.

For the purpose of implementing the arrangements made with Iran for the operation of the oil industry in South Iran, two operating companies incorporated under the Laws of the Netherlands have been formed by the participating Companies the one, Iraanse Aardolie Exploratie en Productie Maatschappij (Iranian Oil Exploration and Producing Company), to undertake exploration and production and the other, Iraanse Aardolie Raffinage Maatschappij (Iranian Oil Refining Company), to undertake refining. These Companies have been registered in Iran and they are to have their management and operating headquarters there. The Companies receive the necessary rights and powers from Iran and the National Iranian Oil Company to be the sole operators of the oilfields and refinery, and they will exercise these powers on behalf of Iran and the National Iranian Oil Company to the extent provided in the Agreement. The National Iranian Oil Company is also responsible under the Agreement for such functions as industrial training, public transport and road maintenance, and for housing, medical care, and social welfare; and is to handle the internal distribution of oil products in Iran, and to operate the Naft-i-Shah oilfield and the Kermanshah refinery, which supply a part of the internal requirements of the country.

A company, Iranian Oil Participants Limited, in which the interests of the participating Companies are in the proportions set out above and which holds the share capital of the two operating companies, has been incorporated in England and will have its head office in London. Another company, Iranian Oil Services Limited, in which the interests of the participating Companies are in the same proportions, and also incorporated in England and with its head office in London, will service the operating companies with supplies, engineering services, and non-Iranian personnel.

The basis of the arrangements with Iran is an equal sharing between Iran and the participating Companies of the profits arising within Iran from the oil operations. The Agreement is for a period of 25 years, with provision for three five-year extensions. The area is, in the first place, approximately 100,000 square miles; but each of the five-year extensions is conditional on a progressive reduction in area, so that in the last five-year period it would be about half the size of the original area.

The production of crude oil will be increased progressively to bring the total quantity during the first three years up to a minimum of 68 million tons. The crude oil will be purchased from the National Iranian Oil Company and each of the participating Companies will market its share independently.

Part of this quantity of crude oil will be processed at the Abadan Refinery. Operations there will be started as soon as possible, although not on the previous scale in view of the greatly increased refining capacity now available in other countries. It is expected that about 30 million tons of the crude oil will be processed at Abadan during the first three years of operations.

The negotiations with the Government of Iran over compensation resulted in agreement on a net interest-free payment to the Company of £25 million in ten equal annual instalments beginning on 1 January 1957, in full and final settlement of all claims and counter claims.

Anglo-Iranian Oil Company is also to receive from the other participating Companies payments which comprise:—

(*a*) £32.4 million to be paid over approximately twelve months in three equal instalments, the first of which will fall due when exports from Iran under the effective management of the operating companies begin.

(*b*) the sterling equivalent of 10 cents per U.S. barrel (approximately 5*s.* 4*d.* per ton of crude oil at the present rate of exchange) on crude oil and products exported from Iran (otherwise than by the Company itself) under the Agreement with Iran until a total equivalent to $510 million has been paid.

The Anglo-Iranian Oil Company will thus have a 40 per cent interest in the oil operations in South Iran and will receive compensation from Iran in addition to payments from the other seven Companies who are together taking up the remaining 60 per cent interest in the new enterprise.

Having regard to all the circumstances the Directors of the Anglo-Iranian Oil Company consider the settlement reached to be not unsatisfactory, and they gratefully acknowledge the efforts of all those who have contributed to the successful termination of these long and complex negotiations.

Comment in Parliament

The Persian Oil Agreement was commented upon in the House on 1 November when the Secretary of State for Foreign Affairs said, at the end of Question Time, that he was sure the House would have heard with gratification the news that the agreement between the Persian Government and the consortium of oil companies had been approved by both Houses of the Persian Parliament and was signed by the Shah on 29 October.

The companies had already begun operations and British tankers had loaded oil at Abadan for the first time for over three years.

Her Majesty's Government warmly welcomed this satisfactory conclusion of a dispute which did nothing but harm to Persian and British interests. They were convinced that the settlement which had been reached had reconciled to the greatest possible extent the interests of all parties, and would bring prosperity to all concerned, particularly to the Government and people of Persia.

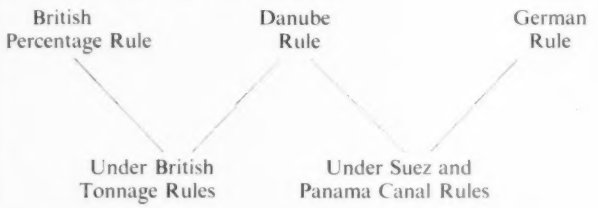
How Big is a Ship?

A series of articles on volumetric and avoirdupois tonnages of ships

By J. ANTHONY HIND,* A.M.I.N.A.

PART III—PROPELLING POWER ALLOWANCE, SUEZ AND PANAMA CANAL TONNAGES, AND GENERAL CONSIDERATIONS

Propelling Power Allowance (P.P.A.) is the most important deduction which has to be made from a vessel's gross tonnage in arriving at the net tonnage and there are three separate ways in which it may be determined, viz.:



Limitations are imposed on the length of the machinery spaces allowable for measurement except where the percentage allowance has been obtained under the British regulations. Certain classes, *e.g.* tugs, do not have this limitation imposed.

There are regulations as to how the machinery spaces are to be defined and also as to what constitutes a machinery space. Machinery spaces consist of the following:

(*a*) Space below crown of engine and boiler rooms.
(*b*) Spaces between crown and upper deck containing machinery or light and air.
(*c*) Spaces similar to (*b*) above upper deck.
(*d*) Shaft tunnels and recesses, and escape trunks.
(*e*) Properly fitted oil fuel settling tanks of reasonable extent (say three or four days' supply) may be included.

Spaces within the above but not used for main propulsion are not to be considered as contributing to the machinery space measurement. Engineers' workshops, stores, dynamos, switchboards, and water and oil storage tanks are typical examples.

British Percentage Rule

Within a range of machinery space which is between just over 13 per cent and up to 20 per cent of the vessel's gross tonnage the shipowner can claim a deduction of 32 per cent of the gross. This applies to the usual screw-propelled vessels, but if a paddle steamer is being considered, a propelling power allowance of 37 per cent of its gross tonnage is gained when the machinery space is above 20 and below 30 per cent of the gross tonnage.

Danube Rule

Where the machinery space in screw vessels is not greater than 13 per cent of the gross the deduction is the actual tonnage of the machinery space multiplied by $1\frac{3}{4}$. For paddle steamers where it is not over 20 per cent of the gross, the P.P.A. is actual tonnage of machinery space multiplied by $1\frac{1}{2}$.

When the machinery space of a screw vessel is over 20 per cent of the gross tonnage the shipowner may exercise the option of having the P.P.A. based on the Danube Rule instead of on the British Percentage Rule. Some benefit may thereby be obtained, but an upper limiting allowance will be applied.

*Naval Architect, Hardy, Tobin and Co. Ltd.

German Rule

This rule arises out of a suggestion made by the Board of Trade that the bunker capacity should be included in the spaces available for deduction, the maximum allowance being 50 per cent of the gross tonnage. A Bill to make this Law did not survive its passage through Parliament, but the system was afterwards adopted in Germany. One objection to this rule was its difficulty of application in the ships of that time, which were coal burners having movable reserve bunkers.

Light and Air

The tonnage of light and air spaces can be included in the machinery space tonnage if desired in order to obtain either the 13 or the 20 per cent capacity of the gross, thereby qualifying for the 32 per cent deduction. However, this is subject to certain conditions. The inclusion of light and air spaces must be requested in writing to the Ministry of Transport, and the spaces concerned must be safe and seaworthy and not exceed or project beyond the main machinery space. Only a breadth of light and air space not exceeding half the tonnage breadth amidships will usually be recognized for deduction purposes. Any plated-over portion within the light and air spaces is disregarded as contributing to light and air. Fig 1 is a typical example showing light and air spaces above the main machinery of a vessel. Any or all of these spaces may be used to contribute towards the machinery space tonnage provided they are properly defined, but whole spaces, not just bits and pieces of any space, must be used. Light and air spaces are normally exempt, but if they are added to the machinery space measurement they must, of course, be included in the gross tonnage.

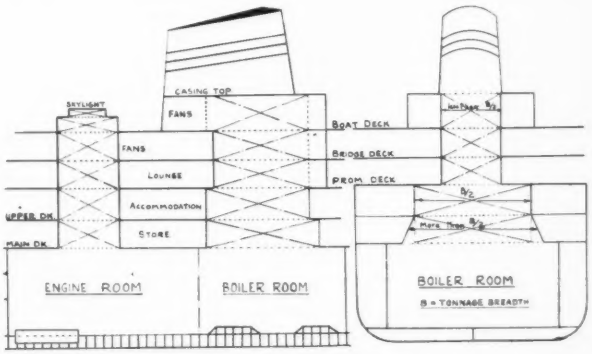


Fig 1. *Profile and section showing extent of light and air spaces.*

Example of British Tonnage Calculation

In a previous article of this series gross and net tonnages were discussed. Now that the question of the P.P.A. has also been dealt with, it is possible to give a typical British tonnage calculation for an ordinary shelter-deck cargo steamer with tonnage openings in the shelter deck and forecastle.

Underdeck tonnage	5090
Store spaces in closed 'tween deck	34
'Tween deck stores	36
Accommodation in closed 'tween decks aft	109
Houses in forecastle	4
Deckhouses (not including wheelhouse and galley) (Wheelhouse, galley, forecastle, and steering gear space, which in this case are above the upper deck, are exempt).	282

The tonnage of the above is 5555 and $\frac{1}{2}$ per cent of this is nearly 28 tons, so there will be no addition to the gross tonnage for hatches, which are only 19 tons, *i.e.* no excess hatches.

Now the space actually occupied by the machinery is 697 tons and in order to qualify for the 32 per cent deduction this space must reach not less than 13 per cent of the gross tonnage. Obviously some light and air will have to be used to attain this.

Then:—Actual machinery space	= 697	
Add light and air	= 29	
	726	
13 per cent of 5584	= 726	
Add light and air space		29
GROSS TONNAGE		5584

Deductions from gross tonnage to obtain net:	
Propelling Power Allowance (32 per cent of gross tonnage)	1787
Deductible crew spaces	350
Allowances under Section 79 Merchant Shipping Act:	
Boatswain's store (58 tons) 1 per cent limit	56
Navigating spaces	25
Fore peak (After peak does not qualify for deduction because it contains fresh water).	46
Total deductions	2264
Gross Tonnage	5584
Deduct	2264
NET TONNAGE	3320

Criticisms

The unfairness of the system of deduction for propelling power can be seen if we consider a screw steamer of about 3000 gross tons under the British Percentage Rule. With an engine room capacity of 389 tons, which is just under 13 per cent of the gross, the P.P.A. would be about 681 tons. If, however, the engine room capacity were 390.1 tons, the P.P.A. would be 960 tons, an advantage of 279 tons for the sake of one ton more of engine room capacity! Of course, such a case never arises in practice, because ship designers will always make a special effort to see that the required 13 per cent of the gross tonnage is obtained in the machinery space measurement by the addition of uselessly large light and air spaces, quite unnecessary for the efficient working of the engines. Even the addition of the space between the exhausts and silencers within the funnel casing may be resorted to in order to reach required capacity! The advances towards more power in less space have been such that most ships can quite comfortably accommodate the necessary machinery within far less space than 13 per cent of the gross and there is no option but to add light and air if the maximum advantage is to be gained in the propelling power allowance. Oil tankers in particular often had difficulty in satisfying the required engine room capacity.

If the observations of Scott Russell on this point are to be taken seriously then the origin of the 32 per cent deduction is of questionable repute. According to him, it may have been inserted in the Act for no other reason than that various gentlemen considered their best interests to be served thereby and that it covered them against future contingencies. However, Scott Russell may have been coat trailing and a more probable reason is that at the time the 32 per cent deduction was the fairest compromise between the demands of the shipowners and the other interested parties.

Another anomaly concerns the absurd double deduction of bunker capacity. Many vessels carry their fuel in the double bottom, which is exempt in any case. Under the Danube Rule the $\frac{3}{4}$ fraction of the $1\frac{3}{4}$ constant is intended to cover the allowance for bunkers, but the average bunker capacity of modern vessels will not be more than about a quarter of this.

The present system of deduction is supposed to be based on the principle of earning ability; however it might be questioned to what extent this principle has been maintained. A large number of vessels derive a not inconsiderable benefit from the quality of their propelling power. It cannot be denied that the high speed of passenger-cargo and fast refrigerated tonnage is a major factor in their earning ability.

Some simplification of Propelling Power Allowances has been introduced in a Bill (Merchant Shipping Act 1954) which became effective on 1 July 1954. This Act amends Section 78 of the Merchant Shipping Act 1894 and concerns the amelioration of penalties placed upon a relatively small engine room. (See Fig 2.) As indicated above, the whole trend of marine engineering today is towards higher power-space ratios; in fact there are naval architects and marine engineers whose vision of the future is the crewless engine room with Bridge control.

Under the new regulations, a vessel having an engine room tonnage of exactly 13 per cent of the gross tonnage will obtain a P.P.A. of 32 per cent of the gross tonnage when calculating net tonnage. If the machinery space is less than 13 per cent of the gross the allowance is proportionately reduced from 32 per cent, *e.g.*,

machinery space = 10 per cent of gross tonnage.

then P.P.A. $= \frac{10 \times 32}{13}$ per cent of gross tonnage.

This gives a favourable difference of more than 7 per cent over the old method of $1\frac{3}{4} \times$ actual measurement.

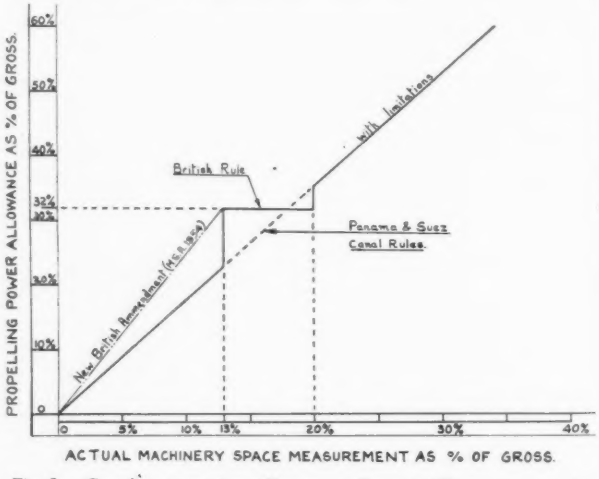


Fig 2. Graphs comparing allowances for propelling power under the various tonnage rules.

Suez and Panama Canal Tonnages

The regulations for Suez Canal tonnage are very much like the British, with small variations concerning exemptions and deductions. It is important to note that to gain the exemptions under the Suez Rules the spaces concerned must also be entitled to exemption under British Rules. Even then Suez regulations are more stringent in the amount of space permitted for exemption and the qualifications necessary to gain it.

Fig 3 shows exemptions permitted for first-tier erections in a three-island type cargo vessel. The illustration shows that the forecastle is exempt for only one eighth of the length of the ship from the inside of the stem, and the poop for one tenth of the length from inside of frames. Within the open bridge space the only exemptions are for that space abreast the machinery space openings in the deck and in way of permanent side openings. Light and air spaces are only exempt above first-tier erections. There is no shelter 'tween deck exemption under either Suez or Panama Canal Rules. The main difference between the Suez regulations and the British lies in the P.P.A.

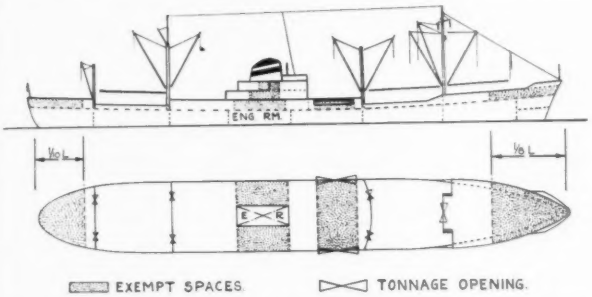


Fig 3. Tonnage exemptions under Suez Canal Rules for a typical freighter.

The Suez regulations do not allow the 32 per cent deduction, but only $1\frac{3}{4}\times$ actual machinery space measurement. The P.P.A. is by Danube Rule in all cases, but in ships with permanent bunkers the German Rule is used unless the shipowner prefers the Danube Rule. There is a limit to the P.P.A. of 50 per cent of the gross tonnage, which does not however apply to tugs. The total deduction apart from the P.P.A. may not exceed 10 per cent of the gross. A point of particular interest is that any double-bottom tank containing fuel will be added to the net tonnage for payment of dues at the time, but this is not a permanent addition. Suez Canal Rules give, on an average, a tonnage a little more than British and appreciably more than Panama.

In 1938 the Panama Canal Rules were extensively revised, but this did not affect the net tonnages of ordinary general cargo vessels very much. They gained only a slight reduction in the net tonnages. For the passenger vessel, however, there was considerable benefit, since all public rooms, toilets, and passages serving them became deductible items, causing drastic reduction in their net tonnages. This placed all vessels on the same footing. The other important change from the old Panama rules was the exemption of double bottoms not used for cargo. The only spaces which shall be allowed to be exempt are strictly defined. The assessment of machinery space is stricter than the British, as galleries and flats are excluded from the main engine room measurement if they contain service tanks, spares, or stores taking up more than 50 per cent of the space of those parts. Settling tanks are also excluded. The P.P.A. is by Danube Rule or German Rule if the owners prefer it. The limit is 50 per cent of gross tonnage as for Suez.

General Considerations

For the reader who wishes to enquire a little deeper into the subject of average relationships between the various measurements of volume and weight in different types of ships there is much published information, although this is unfortunately rather scattered.

Comparisons of this sort are very useful in affording a rough and ready guide as to what might be expected of one measurement when the other factors are known, always provided that similar types of ships are being considered and any differences allowed for. With the right sort of facts and a little practice it is quite easy to "guess" information about existing vessels provided no attempt is made to deal with special types and rough approximations only are required. For the preliminary tonnage estimates of new vessels, however, it is necessary to go into comparisons in considerable detail requiring a large amount of detailed information on existing ships. This is not difficult, but owing to the large number of variable factors which have to be considered and their effect upon other matters, it is a process requiring judgment and experience.

The usual expression given for the gross tonnages of similar ships is the continued product of the length, breadth, depth, block coefficient*, and a factor depending on the type of ship. The average net–gross ratio of an ordinary general cargo ship is between 62 and 63 per cent and for a passenger vessel in the region of 45 per cent. A typical deadweight–displacement ratio for a single-decked three-island cargo ship may be from about 68 per cent up to 72 per cent for the shelter deck type. Coasters may have a somewhat lower value averaging about 63 per cent. Since the first world war deadweight–displacement ratios generally have been decreasing, chiefly owing to the greater speed requirements of modern times. There are other influences too, but these are somewhat offset by improvements in other directions such as lighter hull construction obtained from the large scale application of electric welding.

The relationship of grain to bale capacity is reasonably constant. Bale capacity is usually about 90 per cent of the grain in ordinary cargo vessels, but, to take one example as a warning, the modern refrigerated cargo ship is very much less straightforward because of numerous adjacent spaces of very different application and the extent and type of refrigeration employed.

Whilst reading through this and the previous articles in the series the reader may well have found some aspects of tonnage measurement complicated and apparently inconsistent. Such is admittedly the case, but it is not necessarily the fault of the authorities who formulate the regulations. Although shipowners have sought, quite naturally and rightly, to gain the best out of the rules, there have been those, and there still are, who no sooner are they asked to comply with a rule formulated to protect the interests of the shipping community as a whole than they seek to employ every possible device to circumvent it. The unfair advantage over everyone else gained thereby eventually defeats its own purpose, as it only needs one member of the shipowning fraternity to deviate from the spirit of the rules for every other shipowner to be obliged to do likewise for his own protection. This inevitably results in further legislation to preserve the original intention of the tonnage rules and piles further complication upon complication.

The following are put forward as the ideal " golden rules " for any successful system of tonnage measurement.

The Rules:

(1) Should be fair as between those who provide the shipping services and those who pay for them.
(2) Should be fair as between ship and ship.
(3) Should not affect the design of ships.
(4) Should be capable of application whether theoretical and design data (plans) are available or not.

* The block coefficient is the ratio of the underwater volume of the vessel's moulded form up to some specified water plane, to the volume of a circumscribing rectangular block.

★ ★ ★

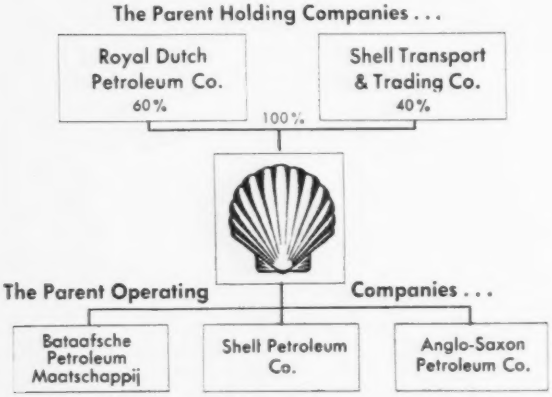
CHEMICAL LABORATORY EXHIBITION

An exhibition of chemical laboratory apparatus, instruments and techniques is to be arranged by the Manchester and District Section of the Royal Institute of Chemistry in connexion with its Annual General Meeting.

The exhibition is to be held at the Manchester College of Technology and will be open from 2 to 8 p.m. on 5 January and from 10 a.m. to 8 p.m. on 6 January.

The Royal Dutch/Shell Group

These companies head the Royal Dutch/Shell Group . . .



Which control some 440 companies around the world

A British firm carrying on general trade in the Far East, "selling cloth and pins and pianos and bringing back the knick-nacks—little boxes and decorative shells—beloved of Victorian England", is scarcely recognizable as a description of the firm which eventually became one of the two parent holding companies of the Royal Dutch Shell Group.

The "two-headed giant of oil with 440 arms" is the way in which the Group is described in an article on its origins and activities featured in the U.S. publication *Business World*. The origins of the Group are traced from 1830 when the British trading firm of Marcus Samuel and Co., referred to above, was first set up. As the century progressed the firm's Far East trade expanded to include the kerosine trade and later the firm entered into oil production at Borneo. At the same time the Royal Dutch Company for the Working of Petroleum Wells in the Netherlands Indies, the original name of the Royal Dutch Petroleum Company, was established.

In 1897 the petroleum interests of Marcus Samuel were separated as the Shell Transport and Trading Company and after six years of strife between themselves, and with the Russians and Standard Oil, Royal Dutch and Shell joined forces.

A merger did not take place but the two portions set up three wholly owned subsidiaries—the Asiatic Petroleum Co. (now Shell Petroleum), the Anglo-Saxon Petroleum Co., and Bataafsche Petroleum Maatschappij; Royal Dutch holding a 60 per cent and Shell a 40 per cent interest.

The two parent companies are purely holding companies, overseeing their interests through the three operating companies. These three have in turn become holding companies in their own right, Shell Petroleum (London), for example, both manages distribution itself and owns other companies that do.

Business World summarizes the activities of this "titan" group, "the largest business enterprise headquartered in Europe", in the following way:

(1) It has a total or majority interest in 440 companies and a minority or 50 per cent interest in another score;

(2) produces, processes, and sells oil and oil products—and a growing line of petrochemicals—in nearly every nation this side of the Iron Curtain;

(3) has increased its yearly supplies, by production and by long-term purchase contracts, 60 per cent in five years, to 617 million barrels in 1953, 12.3 per cent of world production;

(4) operates 500 or more tankers with a simultaneous lift capacity of 6.9 million dwt, roughly equal to the entire U.S. tanker fleet; owns outright or has a considerable interest in 15,000 miles of pipelines; last year "gassed" aircraft over one million times at 1300 airports.

★ ★ ★

Trade Literature, etc.

Posted Price for Middle East Crudes

Anglo-Iranian Oil Co. Ltd. has announced that with effect from 29 October its Posted Price Schedule for Middle East crudes now includes the following additions:

Iranian Light Export $1.91 per barrel for gravity 34/34.9° API f.o.b. Bandar Mashur.

Iranian Light $1.86 per barrel for gravity 34/34.9° API f.o.b. Abadan.

Iranian Heavy $1.67 per barrel for gravity 31/31.9° API f.o.b. Abadan.

Prices for all other grades remain unaltered.

New Aldis Signalling Lamp

A new model "Longrange" signalling lamp recently demonstrated by Aldis Bros. of Birmingham combines efficiency of operation with a strength of signal which is said to be five times more powerful than that of the firm's previous model.

New Electrode Holder

A brochure giving details of a new welding electrode holder which is now available in the U.K. can be obtained from the Lincoln Electric Co. Ltd., Welwyn Garden City, Herts.

Filtration and Lubrication Equipment

Liquid Systems Ltd. are to manufacture and distribute under licence filtration and lubricating systems and accessories designed by Bowser International Inc. (U.S.A.), Bowser International Ltd. (London), and Rubery Owen and Co. Ltd., Darlaston.

★ ★ ★

CRUDE OIL PRODUCTION

	1954	
	Sept.	*Jan. to Sept.*
	Tons	
Iraq Petroleum Co. Ltd.—Kirkuk	1,961,212	17,577,065
Basrah Petroleum Co. Ltd.—Zubair	440,674	3,330,096
Mosul Petroleum Co. Ltd.—Ain Zalah and Butmah	98,670	964,598
Qatar Petroleum Co. Ltd.	374,154	3,428,888
Kuwait Oil Co. Ltd.	3,774,492	34,054,669

Fourth World Petroleum Congress

Rome, 6–15 June 1955

The work of organizing the Fourth World Petroleum Congress to be held in Rome in eight months time is already in full swing under the guidance of a General Organizing Committee of four. Chairman of this Committee is Prof Marcello Boldrini, chairman of AGIP, and there are three Vice-chairmen, Dr Vincenzo Cazzaniga, chairman and managing director of the Italian Esso Standard, Dr Gaetano d'Amelio, chairman of Unione Petrolifera and member of the Board of Directors of the Italian Shell, and Prof Filippo Pennavaria, chairman of STOI. The detailed work of organization has been divided among various committees, with Dr Arturo Muston, executive of the Italian Esso Standard, in charge of the co-ordination of activities and also the direction of the offices.

Committee Organization

Within the General Committee itself, a limited Executive Committee has been formed consisting of the Chairman, the Vice-chairmen, Dr Sergio Ara, manager in Rome of Aquila of Trieste, Count Mario Carrobio di Carrobio, managing director of Purfina, Dr Giorgio Kovacs, general manager of IROM, Dr Mario Mortara, managing director of Condor, Prof Carlo Padovani, member of the Permanent Council of the World Petroleum Congress and Head of the "Fuel Experimental Centre" at the Polytechnic School of Milan, Ferdinando Peretti, chairman of API, and Dr Teofilo Alessandro Salvadori, member of the Board of Directors and technical manager of the Italian Socony Vacuum.

Preparation of the scientific and technical work of the Congress has been entrusted to the Technical Committee, under the presidency of Prof Carlo Padovani.

The Editorial Committee, under the presidency of Dr Mario Mortara, is responsible for technical publications and, in particular, for the preparation of the "Proceedings".

The Press and Publicity Committee is entrusted with the task of handling the various strictly non-scientific publications to be edited in connexion with the Congress; it is also in charge of liaison with the Press of the countries concerned and of publicity for the Congress. Marquis Filippo Pennavaria, Professor at Rome University, is chairman of this Committee, and among its members are several eminent personalities in the Italian oil industry. Among the publications handled by this Committee and entrusted to the Press Service of the Congress, are a survey of the Italian oil industry and a volume illustrating the natural and artistic beauties of Italy which is to be offered to delegates as a souvenir.

The Press Committee will also publish a Guide to Rome for the use of delegates and members of their families.

The Technical and Press Committees together are preparing the "General Programme", containing the definite working schedule of the Congress.

The Hotel Accommodation and Tourist Committee, under the presidency of Dr Vincenzo Cazzaniga, has a particularly delicate and difficult task to fulfil. First, it has to find suitable accommodation for each delegate and the persons accompanying him; secondly it has to prepare a programme of excursions covering Italian centres of interest, both from the industrial and tourist points of view, so that delegates can visit them after the Congress. It has faced the first problem by already reserving as many rooms as possible in Rome's best hotels. June brings a crowd of tourists to Rome and it is therefore advisable that anyone who has not yet registered should send in his application form as soon as possible.

The second problem, that of providing an excursion programme to satisfy all tastes, has been solved by arranging six itineraries covering the main Italian tourist and industrial centres, from one end of the Peninsula to the other. These itineraries are illustrated in a coloured folder which has been sent to intending delegates so that they can choose whichever excursion is of most interest to them.

A Financial Committee to handle the financial questions of the Congress is under the presidency of Dr Giorgio Kovacs, general manager of IROM.

A special programme of entertainments is also being prepared; an opera will be given at the Opera House, an open-air concert in the enchanting ruins of the Basilica of Massenzio, and an international music hall show in one of the largest theatres of Rome.

The plenary sessions and the meetings of sections will take place in the Congress Building of the Rome Universal Exhibitions Centre (EUR), situated a few miles away from the centre of the city on the newly-built road leading to the sea.

The Inaugural Session will take place in the Capitol, the City Hall of Rome, and will be followed by a reception.

The British National Committee

In most of the countries taking part in the Congress, National Committees have been formed, and they are collaborating in the work done by the Italian General Organizing Committee.

The British National Committee is under the presidency of Colonel S. J. M. Auld, O.B.E., M.C., D.Sc., President of the Institute, and is made up of the following members: C. Chilvers, B.Sc., F.R.I.C., Esso Petroleum Co. Ltd., Honorary Secretary of the Institute; Dr E. B. Evans, M.Sc., Ph.D., F.R.I.C., Esso Development Co. Ltd., Honorary Editor of the Institute; H. S. Gibson, C.B.E., M.A., M.I.Mech.E., Iraq Petroleum Co.; H. Hyams, The Shell Petroleum Co. Ltd.; G. Sell, Editor of the Institute; T. Dewhurst, A.R.C.S.; Professor F. H. Garner, O.B.E., Ph.D., F.R.I.C., Birmingham University; W. H. Thomas, A.R.S.M., F.R.I.C., Anglo-Iranian Oil Co. Ltd. The Secretary to the Committee is D. A. Hough, T.D., F.I.A.C., General Secretary of the Institute.

Equipment Exhibition

An International Exhibition of industrial oil equipment is to be organized in Naples at the same time as the Congress, in the premises of the Overseas Exhibition ("Mostra d'Oltremare"). In addition to equipment, plant, and machinery covering every aspect of the oil industry there will also be special sections reserved for industries using oil products as raw material and for manufacturers of equipment and machines for this purpose.

Special excursions will be arranged so that delegates can visit this exhibition when they are free. Apart from these excursions, transport will be available each day to take delegates to and from the exhibition. During the five days following the end of the Congress there will be special facilities for delegates wishing to stay in Naples to visit the exhibition.

There will also be a Photograph Exhibition in the Congress Building of the EUR in Rome which will illustrate the various Italian oil plants and industries connected with petroleum.

Laying the jungle pipeline from Nahorkatiya to Digboi.

The Assam Oil Industry

Birthplace of the petroleum industry in India, Digboi lies in the mountain-locked north-eastern extremity of Assam. Here the pioneer oil explorers of the last century discovered seepages of petroleum in the dense jungle.

Digboi's first well was drilled in 1890, before there were railways or roads or even any inhabitants in the area. Drillers working under derricks thatched with palm leaves banged a hole into the earth's rocks with primitive tools. All their supplies had to be brought by elephant from their base camp, which itself could be reached only by river from Calcutta—a month's journey away.

In time Digboi grew up, and over the years the jungle was pushed back to make way for the oil town and its refinery.

The industry had many early difficulties. The jungle was no barrier, but nature's mysteries were, and the problem was to find enough petroleum to keep the industry alive. More than two hundred and fifty wells were drilled before the Assam Oil Company was placed on a sound commercial footing. Even after that it was only by continuous new drilling that the supply of crude oil to the refinery was maintained. Altogether some 950 wells have been drilled in the Digboi oilfield since it was discovered in 1890. Most of the old exhausted wells are now completely shut in by trees and jungle while those still producing raise their maintenance derricks against the skyline.

The refinery at Digboi is the first to come into operation in the Indian Union. The plant, which has kept in step with modern developments in petroleum refining technique, processes about 6000 barrels of crude oil daily, and throughput is increasing

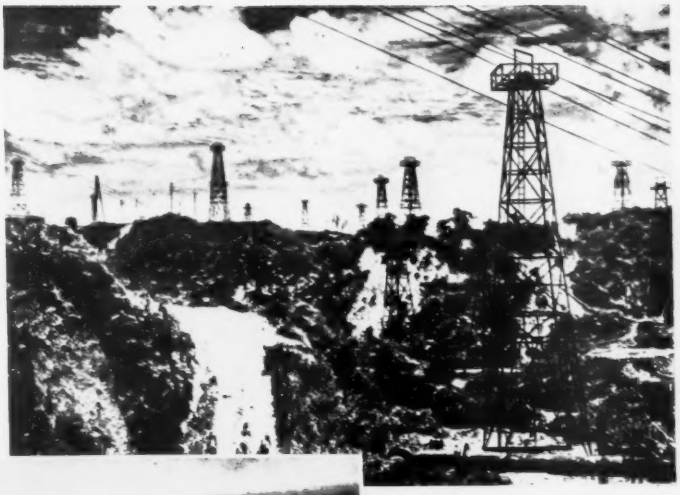
Digboi today is a modern healthy town of 40,000 people, 7500 of whom are on the industry's payroll. Welfare is not forgotten and the social needs of life in the oil industry are catered for in various ways. There are eight company schools, a modern hospital, maternity services, sports fields, playing grounds, a fully equipped welfare centre, and places of worship to suit the needs of the many different communities in Digboi. There are also clubs where employees may spend their leisure time, one of the most popular being the Digboi Indian club.

The search for more oil has taken AOC explorers into new areas of the Assam Valley. Nahorkatiya, 20 miles from Digboi, was recently confirmed as a new and important oilfield, and a company-built road through dense jungle connects it with its old-established neighbour.

(Left) A view of Digboi refinery, the first petroleum refinery to operate in the Indian Union, which has a throughput of 6000 *barrels per day. (Right) Part of the general workshops and field stores.*

(*Above*) *Nahorkatiya Well No.* 1. *Helicopters speed up oil surveys in the Brahmaputra Valley.*

(*Below*) *Digboi oilfield in* 1905 *when simple drilling outfits operated under derricks thatched with palm leaves.*



(*Above*) *Oilfield scene—skyline of maintenance derricks.*

(*Centre*) *Jungle highway. The new Digboi-Nahorkatiya roadway running through forest and thick jungle to join the old and new oilfields of Assam.*

(*Below*) *Welfare amenities—children at the Digboi Indian Club performing an Assamese dance.*

Personal Notes

Following his talk to the members of the Institute on 20 October, Dr G. Egloff was entertained to dinner by the Council. Here he is seen (left) addressing the company and (right) with Dr A. Dunstan in a characteristic attitude.

One of the most important commercial appointments in the world has been taken over by **J. B. Scott,** C.A., who recently became controller and secretary of The Shell Petroleum Co. Ltd. and The Anglo-Saxon Petroleum Co. Ltd.

Mr Scott, who comes from Dundee, is a member of the Institute of Chartered Accountants of Scotland. He joined the Royal Dutch Shell Group in 1933, after having spent some three years with Messrs Mann Judd Gordon and Co., Chartered Accountants, in London. For the next fourteen years he served overseas in Australia, New Zealand, and Trinidad, returning to London at the end of 1947 to take up the position of deputy controller.

G. S. Paterson, C.A., will succeed Mr Scott as deputy controller.

Sir George E. Bailey, C.B.E., has resigned from his position as chairman of Metropolitan-Vickers Electrical Co. Ltd., and the deputy chairman of the Company, **Sir Felix J. C. Pole,** has resigned from the Board of Directors.

The Rt. Hon. The Viscount Chandos (formerly Mr Oliver Lyttelton), P.C., D.S.O., M.C., has been elected a director and chairman of the Board.

Sir George was appointed chairman of Metropolitan-Vickers in 1944 and in the following two years became successively managing director and deputy chairman of Associated Electrical Industries. He became chairman in 1951.

Sir George is President of The British Electrical and Allied Manufacturers' Association.

Viscount Chandos first became chairman of A.E.I. in 1945 and held this position until his appointment as Secretary of State for the Colonies in 1951. At the end of his period in office, in August 1954, he resumed his position as chairman of A.E.I.

THE BRUSH GROUP

The Brush Group Ltd. announce that the following changes within the Group will shortly take place:—

S. Webster, at present managing director of Bryce Berger Ltd., will become deputy managing director of The National Gas and Oil Engine Co. Ltd.;

B. D. Giordan, at present works director of Mirrlees, Bickerton and Day, Ltd., will become managing director of Bryce Berger Ltd.;

D. G. Hawkins, at present general manager of The National Gas and Oil Engine Co. Ltd., will become assistant Group sales director;

R. G. Hooker, at present works manager of J. and H. McLaren Ltd., will become general works manager and director of Brush Electrical Engineering Co. Ltd.;

B. R. Cant, at present personal assistant to the Group managing director, will become works manager of J. and H. McLaren Ltd.

★ ★ ★

Economics and Operations Group

The Institute's Economics and Operations Group formed just over 12 months ago now has over 100 members and it is hoped that even more interest will be shown in the Group during the 1954-55 session. The aim of the Group is to invite interesting and fruitful discussions on topics concerned with economics, distribution, transport, and storage.

There is an interesting and varied programme for the current year. The first meeting was held in the Institute on 14 October, when a paper on "Recent Trends in the Handling of Oil Products in the U.K." was given by S. D. Colwell of Shell-Mex and B.P. Ltd., the paper being followed by discussion. On 16 November, C. Dalton (Esso Petroleum Co. Ltd.) spoke on "The Outlook for U.K. Energy Needs". This will be followed on 4 January 1955 by a talk by D. C. Ion of the Anglo-Iranian Oil Co. Ltd. on "The Economics of Canadian Oil". Next comes "Mechanization in Oil Company Administration" by A. E. E. Morgan of Shell-Mex and B.P. Ltd., on 2 February. On 1 March it is proposed to hold a "Symposium on Public Opinion and the Oil Industry" at which there will be three speakers. Finally, the session concludes with a talk by W. A. C. Strugnell (Esso Petroleum Co. Ltd.) on "Trends in Motor Vehicle Population and their Effects on Petroleum Consumption".

In order to allow adequate time for discussion, it is intended to keep the papers quite short. It is also being arranged to circulate a synopsis of each paper about a week before it is given in order that members attending the meeting may be able to take a more active interest in the discussion.

Notes of the Month

Scientific Film Congress

Six general scientific films were shown in Rome during the VIIIth International Scientific Film Congress which was held from 6 to 12 November. They included "The Gas Turbine", made by the Shell Film Unit, and "Assam Oil Survey", made by Rayant for the Burmah Oil Company.

British Oil Search

A site at Hathern near Loughborough has been chosen by Anglo-Iranian's D'Arcy Exploration Company for their latest activities in oil well drilling in the U.K. The well is to be drilled to a depth of 1500 ft.

Another well has also been drilled at Bottesford, 16 miles east of Nottingham, and there is further activity at Plungar where there are now six wells in all, two of them producing a small quantity of oil.

Swedish Lubricants Blending Plant

Over 20,000 tons of lubricants a year can be handled at the new, fully-integrated plant for blending and packaging lubricants which has recently been opened by Svenska Shell at Rasta, near Stockholm, Sweden. All the main ranges of lubricating oils, including Shell X-100, will be produced at the new plant.

Costing over £400,000, the main facilities will consist of eleven storage tanks with a total capacity of over 11,000 metric tons, blending tanks, including jet blenders for additive oils, a package filling and storage building, and automatic tin and drum filling machines.

Sweden has the highest consumption of petroleum products per head of population in Western Europe, about 180 Imp. gal. per year. Her consumption of lubricants is at present about 85,000 tons a year and is expected to increase still further during the next five years.

"Oil for Britain" Exhibition

An exhibition tracing the story of oil from its formation in the earth, through all the different stages of production and refining to its final distribution to the consumer, was held in Glasgow during October.

The exhibition was organized by Esso Petroleum Co. Ltd. and its centrepiece was a 16-foot square model of the Esso refinery at Fawley.

The Lord Provost of Glasgow, The Rt. Hon. T. A. Kerr, performed the opening ceremony and an address was given by E. F. Choppen, assistant general sales manager of the Esso Company. Mr Choppen outlined the factors that had necessitated the building up of a large scale oil refining business in Britain since the war, and said that at a cost of £190 million to the companies concerned, our refining capacity had been raised from 2½ million tons in 1948 to nearly 29 million tons in 1954. This had made Britain the third greatest refining nation in the world following the U.S.A. and the Netherlands West Indies.

Domestic consumption, said Mr Choppen, was about 20 million tons, and this meant that Britain's oil exports were now a valuable asset, currently worth over £80 million a year, which was well above the value of coal exports.

I. Brackenridge, manager of the Scottish Division of the Company, presided at a luncheon following the opening ceremony at which the Lord Provost was represented.

Speaking at the luncheon, J. L. N. Pollock, a director of the Company, emphasized the great and growing need for industry to study its human relations problems. Only by serious application to the study of the needs of the individual would it be possible, said Mr Pollock, to create the proper atmosphere in which our industry could prosper in a highly competitive world.

"Human beings are inconsistent, and often unpredictable," Mr Pollock said. "They still remain human beings, and what is surely needed is some formula by which they can learn to get along one with another. I am sure in industry, and in your great industries, there is a growing realization that the total contribution of an industry or a company is no greater than the cumulative efforts of hundreds, and maybe thousands, of people."

Twenty-six nations were represented at the first International Fair of Damascus which was held during September on a site stretching along the banks of the River Barada. Pictured above is the exhibit of the Iraq Petroleum Company, the main feature of which was a big working model of the pipelines and the terminals of Banias and Tripoli.

Symposium on Scientific Research

Problems which arise in the organization and administration of scientific research in Europe were studied by delegates at an International Symposium held recently at the University of Nancy. The Symposium was organized by the European Productivity Agency of the Organization for European Economic Co-operation (OEEC), and the Rector of the University of Nancy acted as Secretary-general.

This is the second meeting of its kind, the first International study session having been convened by OEEC in London in November 1952.

The aim of the Symposium was to enable representatives of government bodies, university teachers, and European industrialists to study the progress achieved by member countries in the administration and organization of scientific research, and means of developing co-operation for the furtherance of applied research between national bodies, industries, and higher educational establishments.

The first day of the meeting was devoted to the consideration of the practical organization of research, the chairman being Dr A. King, head of the Intelligence and Overseas Scientific Relations Divisions, DSIR, and chairman of the Productivity and Applied Research committee of OEEC.

Discussion on the second day centred on the importance of human factors and the team spirit in scientific research, and on the third day on the industrial application of the results of research. In this connexion, special emphasis was laid on

problems of technical information and on co-operation between scientific and industrial bodies.

Anti-Corrosion Studies

European experts conferred on corrosion problems at meetings organized by the Organization for European Economic Co-operation (OEEC) during the 27th International Congress of Industrial Chemistry held recently in Brussels.

They were unanimously in agreement that a European association should be speedily set up in which corrosion specialists could group together and which would become a centre for the exchange of information.

This suggestion was contained in the report of a study mission to the U.S.A. arranged under the OEEC Technical Assistance Programme during the summer of 1953.

The study mission dealt with corrosion problems and prevention in the chemical and petrochemical industries in the United States where annual losses from corrosion are estimated at between five and a half and six thousand million dollars, and involve the destruction of more than 2 per cent of total steel tonnage.

An association of the type suggested in the report of the study mission already exists in the U.S.A. and has proved invaluable in the co-ordination of anti-corrosion methods.

" Big Lift " at Stanlow

A 200-ft column has recently been erected at Shell's Stanlow refinery as part of a new " iso-pentane " plant which is at present under construction. The column is believed to be the tallest of its kind in the world.

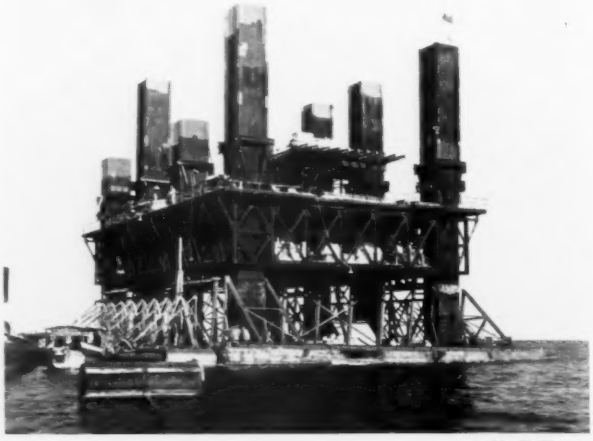
" Iso-pentane " is an important constituent of aviation gasoline; the new plant for its production is expected to cost nearly £500,000.

A Shell Photo

The column being raised to a vertical position.

Steel Island for Underwater Oil Search

The 1200-ton movable island of steel pictured below was set up recently five miles off-shore in the Persian Gulf to help in underwater drilling for oil. Shell's oil concession covers a large area of the Persian Gulf beyond the territorial waters of the independent sheikdom of Qatar on the north-eastern coastline of Arabia. Serious problems arise in drilling underwater and this strong movable platform has been devised to overcome them.



A Shell Photo

View of drilling platform in final stages of construction

About £500,000 have been spent on building the island, the steelwork of which was fabricated in the Netherlands and shipped out to Doha in Qatar. There, the erection work was carried out by George Wimpey and Co. Ltd. of London and the island placed at the first exploration drilling site, selected after geophysical surveys.

The platform was erected in the harbour of Doha on top of two 1000-ton pontoon barges, and was towed out to the selected drilling location, known as "Matbakh No. 1", about 35 miles north of Doha. When on site, eight heavy steel spuds or legs incorporated in the structure were lowered to the sea bed. After this, a system of powerful hydraulic jacks came into operation and lifted the platform itself up on the spuds, thus raising it clear of the supporting steelwork on the pontoons and allowing these to be withdrawn. When, in due course, the first well is completed, the pontoons will be brought back, the whole operation repeated in reverse, and the platform towed away to the next location. Should the well be successful in finding oil a much smaller platform will be constructed around the well site to provide access—and protection—to the well-head fittings.

The main deck of the drilling platform is 140 ft long by 90 ft wide and is about 40 ft above the level of the water. The drilling rig which is to be used on the first well is an Ideal 50, capable of reaching a depth of 7000-8000 ft. The high winds and short seas experienced in the Persian Gulf make it impossible to conduct regular relief of drilling personnel and the platform, therefore, has accommodation for two complete crews including storage, refrigeration, working facilities, and air-conditioning. The relief of personnel and the supply of drilling and other materials will be carried out by tugs and barges from Doha, where the main camp is situated.

New Anglo-Iranian Tanker

When the 16,000-dwt tanker *British Officer* was launched in October by Mrs Vignoles, wife of C. M. Vignoles, O.B.E., managing director of Shell-Mex and B.P. Ltd. it was the eighth new tanker to join the fleet of Anglo-Iranian's British Tanker Company this year.

The vessel was built on the Clyde by Lithgows Ltd. at the Glen Shipbuilding Yard, and is the fifth tanker launched on the Clyde this year for the British Tanker Company.

One more tanker, *British Victory*, will be launched this year. This 32,000-dwt vessel is scheduled to leave the Barrow yards of Vickers-Armstrong Ltd. during December.

Vacuum's 20-Year Club

Members of the staff of Vacuum Oil Company who have completed 20 years' service met on 22 October at celebration dinners held simultaneously at seven different centres in the British Isles.

At the London dinner, held in the Connaught Rooms, 225 Twenty-Year Club members gathered together from London and the Home Counties. The combined years of service at this dinner alone amounted to 8000.

Guest of honour was Sir Alexander McColl, a former chairman of Vacuum Oil Company and R. P. Motson, manager of Vacuum's Southern Industrial Division, took the chair.

At the same time similar dinners were taking place throughout America and in many other countries and the various gatherings at home and abroad exchanged messages of greeting and good wishes.

New Cat-cracker at Belgian Refinery

A new 3600-b.d. Houdriflow catalytic cracking unit recently came on stream at the Antwerp refinery of Albatros S.A. Belge pour le Raffinage de Pétrole. Work on the unit was carried out by Head Wrightson Processes in conjunction with the Houdry Process Corporation and World Commerce Corporation of New York.

The Albatros refinery, which began operations in 1935, was badly damaged during the war and had to be reconstructed in 1948.

In 1953 work began on a new crude unit, feed preparation unit, Houdriflow cat cracker, gas recovery and stabilization unit, plant for the polymerization of light olefins produced in Houdriflow cracking operations, and new facilities for treating straight-run and catalytic petrols.

The new cat-cracker will produce high-octane petrol to meet the growing domestic demand for high quality motor fuel.

Shell Safety Record

A concentrated drive for safe working has led to the setting up at Ardrossan refinery of a new record for Shell oil refineries in Great Britain. Ardrossan employees have been the first to achieve one million man-hours of operation without a lost-time accident.

The period covered was from 19 January 1952, when an employee suffered a fractured thumb, to 13 October 1954.

This record is a landmark in a period of progressive improvement in Ardrossan's accident record. From twelve accidents in 1948 the figures have been steadily reduced to nil in 1953 and 1954. At the same time accident frequency rates have fallen from the 1948 figure of 2 per 100,000 man-hours worked to zero over the last two years and nine months.

Expansion at Inverness

New pumps were set in motion recently at a ceremony marking the completion of expansion and modernization projects at the Inverness installation of Scottish Oils and Shell-Mex Ltd.

With the addition of three acres of adjoining land leased from the local council, the installation has been re-organized and extended to provide increased storage, improved road wagon loading facilities, a vehicle washing and servicing centre, and a building for filling and handling packages and accommodating general stores.

Two new pump houses have been built and nine main motor-driven centrifugal pumps in all have been installed, with a capacity ranging from 250 to 500 gallons a minute. The main pumps are remotely controlled by push-button electric switches on the filling gantry; the biggest are capable of filling two large road wagons simultaneously.

Speaking of these improvements, T. W. Lyle, general manager of Scottish Oils and Shell-Mex Ltd., said that they were at present engaged in a nation-wide plan to streamline the joint system for the distribution of petroleum products. This plan involved the modernization of many installations and storage depots, the scrapping of small and obsolete ones, and the construction of several new depots.

The new equipment installed, said Mr Lyle, embodied the fruits of half a century's experience in handling petroleum products, and also the latest mechanical devices to ensure quick and efficient service.

Apprentices at Tanker Launching

Nineteen apprentices training as sea-going engineer officers were present at the launching of s.t.s. *Hemiglypta*, an 18,000-ton vessel for the Shell Tanker fleet.

Also present at the launching were six long-service employees from Stanlow oil refinery.

The launching took place at the Cammell Laird yard, Birkenhead, and the ceremony was performed by Lady White, O.B.E., wife of His Excellency the Hon. Sir Thomas White, K.B.E., D.F.C., High Commissioner for Australia.

Hemiglypta is one of a class of 18,000-ton general purpose tankers designed by Shell, of which 10 are already in service and 39 more will be delivered by the end of 1957.

New Underwater Survey at Abu Dhabi

A geophysical survey is now being carried out in the waters off the Persian Gulf territory of Abu Dhabi. The operating company is the Abu Dhabi Marine Areas Ltd., in which the Anglo-Iranian Oil Company and the Compagnie Française des Pétroles are partners.

Earlier this year, geological work was carried out in this area with the help of Commandant Cousteau and his team of divers.

This new survey will employ the latest method of underwater seismic surveying, which will be carried out from the 405-ton ocean-going vessel *Sonic*. The survey is expected to last about four months in all.

Electronic process control equipment was exhibited by Evershed and Vignoles Ltd. at the first International Instrument Congress and Exposition held recently in Philadelphia.
A feature of their stand, pictured above, was the "In-line Scanner", the latest form of miniaturization, which consists of closely mounted shadow-line deviation indicators set in a single line which enable conditions throughout an entire plant to be seen at a glance.

Books and Films

Oil and Petroleum Year Book

The 1954 issue of Walter E. Skinner's annual directory has now appeared. It is in its customary format and contains a mass of information on the oil industry throughout the world. Details are given of 945 companies operating in all branches of the industry, with information regarding their directorate, finance, plant, operations, etc.

There is also a buyer's guide to makers of oilfield and refinery equipment, divided under 875 headings, and a list giving the names and addresses of 628 managers, engineers, and agents in the oil industry.

Copies of the Year Book are obtainable from Walter E. Skinner, 20 Copthall Avenue, London, E.C.2. Price 25*s*.

New Motor Racing Films

Two new films now available on loan from Shell-Mex and B.P. Ltd. deal with different aspects of motor racing. One, entitled *Nürburgring*, has been made to commemorate the twenty-five year jubilee of the famous Nürburgring race track where so many great drivers have competed. The film traces the history of Grand Prix racing at the "Ring" up to the Jubilee Grand Prix of 1952, and there are exciting shots showing the skill of great drivers both of pre-war years and the present day.

The second new film, *Motor Race Marshalling*, deals with the intricacies of motor race organization and shows the care which is necessary to ensure the safety of drivers and spectators at motor race meetings. Apart from its instructive value the film also offers some impressive shots of technique on the track which will appeal to racing enthusiasts.

Atmospheric Pollution

Two new films presented by the Gas Council will certainly be in great demand from the Council's film library.

Guilty Chimneys deals with the problem of atmospheric pollution in a factual yet dramatic way which brings home the costliness of smoke to the nation in terms of both health and money. The film should interest both householders and industrialists.

The Gas Council's second new film *Family Album* is a Technicolor presentation of a typical middle class family living through four generations in the same house. The film shows the changes in standards of living in that period, reflected in the advent of increasingly more efficient household gas equipment.

Both films are available in 16 and 35 mm sizes on loan free from The Gas Council, Gas Industry House, 1 Grosvenor Place, London, S.W.1.

Oil Fuel at Home

An exhibition of oil burning appliances for space and water heating is being staged by Shell-Mex and B.P. Ltd. at the Building Centre, Store Street (off Tottenham Court Road), London, W.C.1.

The exhibition was opened on 7 December and will be open each week-day until 31 December, except over the Christmas holiday period.

About 30 firms are co-operating in the display which will range from the small vaporizing burners used for the household boiler to larger pressure jet or air-atomizing burners. There will also be a number of fuel economizing devices.

★ ★ ★

Photo by courtesy of Esso Petroleum Co. Ltd.

The marine terminal at Fawley. This is one of the largest oil docks in the world, with berthing accommodation for four ocean-going tankers of 40,000 *tons. The terminal handles a daily average of* 8½ *million gallons of crude oil and products.*

PREVALENCE OF SHIFT WORK

In view of the wide application of shift working in the petroleum refining industry the following figures, taken from the October 1954 issue of the *Ministry of Labour Gazette*, are of interest.

The returns received (for April-May 1954) covered 5.5 million wage-earners and 2.8 million were included on returns showing some shift workers; the average number of shift workers for all the occupations covered was 12 per cent, varying from below 1 per cent to a maximum of 42 per cent in the metal manufacturing industry.

The detailed figures for mineral oil refining are as follows:

No. of wage earners on all returns received ...	18,480	
No. of wage earners on returns showing some shift workers	18,262	
No. of shift workers shown on all returns received	6,678	(36%)
No. of shift workers working on:		
Three shift	5,642	(85%)
Alternating day and night shift	187	(3%)
Double day shift. Males	757	(12%)
Females	63	
Evening shift for part-time workers ...	Nil	
Night shift	1	
Other shift systems	28	

Forthcoming Meetings

THE INSTITUTE

(*At 26 Portland Place, London, W.1., 5.30 p.m.—tea 5 p.m.*)

Design and Operation of a Fluidized Pilot Plant for the Fischer-Tropsch Synthesis. C. C. Hall, M.Sc., Ph.D., F.R.I.C., and A. H. Taylor, M.B.E., B.Sc., M.I.Mech.E. (Fuel Research Station, DSIR). **8 December**

Insurance in the Oil Industry. A. T. Wright (Tanker Insurance Co. Ltd.) **12 January**

IP FAWLEY BRANCH

(*At Esso (Fawley) Recreation Club, Holbury, 7.30 p.m.*)

The Application of Electronics to the Oil Industry. J. M. Keating, B.Sc. **17 December**

Engine Design as Influenced by Fuels and Lubricants. C. A. Beard, A.M.I.Mech.E., A.F.R.Ae.S. **14 January**

Annual General Meeting—followed by film show—"Corrosion in Action". **28 January**

IP LONDON BRANCH

(*At 26 Portland Place, London, W.1, 6 p.m.—tea 5.30 p.m.*)

Film Evening. **16 December**

Careers in the Petroleum Industry. E. L. K. Frost. **19 January**

IP NORTHERN BRANCH

(*At Engineers' Club, Albert Square, Manchester 2, 6.30 p.m.*)

Film Show. (Warner's Theatre) and hot pot supper. 5.45 p.m. **14 December**

Presidential Address. Col. S. J. M. Auld, O.B.E., M.C., D.Sc., Ph.D. **18 January**

IP SOUTH-EASTERN BRANCH

(*At King's Head Hotel, Rochester, 7.45 p.m.*)

Control Valves. F. Watts, B.Sc. **7 December**

Brains Trust. **4 January**

IP SOUTH WALES BRANCH

(*At the Training Centre, National Oil Refineries Ltd., Llandarcy, 5.30 p.m.—tea 5.0 p.m.*)

Petroleum and Platforming. A. W. Jeffery. **6 January**

IP STANLOW BRANCH

(*At the Grosvenor Hotel, Chester, 7.30 p.m.*)

Chemicals from Petroleum, the Growth of a New Industry. E. S. Paice, B.Sc., A.R.C.S., D.I.C. **14 December**

The Outlook for the Oil Industry. G. P. Glass, M.A. **19 January**

OTHER SOCIETIES

Some Problems in Lubrication and the Substances called Additives. A. Towle. The Institution of Mechanical Engineers, Automobile Division, London, 5.30 p.m. **14 December**

Recent Studies of Metallic Friction. F. P. Bowden, Sc.D., F.R.S. The Institution of Mechanical Engineers, London. 5.30 p.m. **17 December**

Discussion on Atmospheric Pollution. Opened by G. R. Peterson, B.A. The Institution of Electrical Engineers, London. 5.30 p.m., tea—5 p.m. **10 January**

Social and Industrial Consequences of the Presence of Sulphur in Fuels. Paper 1 in Sulphur Study. Dr A. Parker. The Institute of Fuel, Midland Section, James Watt Institute, Great Charles Street, Birmingham. 6 p.m. **16 December**

SITUATION VACANT

Major Oil Company has vacancies in European Marketing Technical Service Department for graduates having extensive knowledge of the petroleum industry and/or knowledge of industrial oils, greases and metal working products and their formulations and applications. Starting salary dependent upon experience and qualifications, age 30 to 35 years. Apply Box No. 1086.

★ ★ ★

NEW YORK OIL FINDERS CONVENTION, 1955

The 1955 Annual Meetings of the three American petroleum exploration societies—the American Association of Petroleum Geologists, the Society of Exploration Geophysicists, and the Society of Economic Paleontologists and Mineralogists—will be held in the Hotel Statler, New York City, 28-31 March, 1955.

The theme of the meeting will be "The Habitat of Oil in the Sedimentary Basin". To develop this theme, the technical programme committee of A.A.P.G., under the chairmanship of Lewis G. Weeks, Standard Oil Company (New Jersey), is arranging for the presentation of a variety of papers under the following general headings:

(1) Individual papers on about 14 U.S. and 16 foreign producing basins. These papers, each by an authority on the particular basin, are designed to demonstrate the relationship of oil occurrence to the depositional basin.

(2) Papers on topics pertinent to the main theme and on other subjects of timely interest. They will include contributions from various research laboratories.

(3) A symposium, featuring outstanding authorities, on the Late Quaternary Geology of Modern Depositional Basins. Emphasis will be laid on modern basins which simulate the ancient basins of special interest to the petroleum geologist.

The S.E.G. and S.E.P.M. are arranging excellent programmes of papers and symposia designed to further the general theme.

Non-members are invited to attend the Convention and official reservation forms can be obtained from C. W. Flagler, Gulf Oil Corporation, Box 35, Bowling Green Station, New York 4, New York.

BEILBY MEMORIAL AWARDS

From time to time awards are made from the Sir George Beilby Memorial Fund by administrators representing the Royal Institute of Chemistry, the Society of Chemical Industry, and the Institute of Metals. The awards are made to British investigators in science to mark appreciation of records of distinguished work.

Preference is given to investigations relating to the special interests of Sir George Beilby, including problems connected with fuel economy, chemical engineering, and metallurgy.

Awards are made not on the result of any competition, but in recognition of continuous work of exceptional merit, bearing evidence of distinct advancement in science and practice.

In general, awards are not applicable to workers of established repute, but are granted as encouragement to younger men who have done original independent work of exceptional merit over a period of years.

Consideration is to be given to the making of an award or awards from the Fund early in 1955. Outstanding work of the nature indicated may be brought to the notice of the Administrators, either by persons who desire to recommend the candidate or by the candidate himself, *not later than* 31 *December*, 1954, by letter addressed to The Convenor of the Administrators, Sir George Beilby Memorial Fund, Royal Institute of Chemistry, 30 Russell Square, London, W.C.1.

The letter should be accompanied by *nine copies* of a short statement on the candidate's career (date of birth, education and experience, degrees and other qualifications, special awards, etc., with dates) and of a list of references to papers or other works published by the candidate, independently or jointly.

Author Index

ABRAHAM, W. E. V., Strategic Aspects of Supply and Demand, 45.

ALEXANDER, J. O. M., This Detergent Age, 235.

AMBROSE, T. D., Distribution and Industrial Uses of Fuel Oil in the U.K., 68.

APPLETON, A. A., AULT, W. S., and WEINSTEIN, M. E., Petroleum Taxation—Dilemma or Challenge?, 156.

AULT, W. S. *See* Appleton, A. A.

BISKE, V., Any Matches?, 75.

CHAMBERLIN, G. J., Colour Standards, 121.

DREW, CAPTAIN J. H., The Constructional, Operational, and Safety Features of the Modern Ocean Tanker, 39.

FRESHWATER, D. C., Chemical Engineering: Absorption and Stripping, 30.

——., Adsorption, 79.

——., Distillation, 10.

——., Filtration, 95.

——., Instrumentation, 113.

——., Solvent Extraction, 55.

FROST, E. L. K., Staff Communications, 144.

GLASS, G. P., The International Economic Situation and the World Oil Industry, 1.

GUNTHER, A. E., Petroleum Geology and Developments in 1951-52, 21.

HILLS, A. T., Road Transport in the Oil Industry, 211.

HIND, J. A., How Big is a Ship?: History of Capacity Measurements and Explanation of Weight Terms, 205.

HIND, J. A., Gross and Net Tonnage, 227. Propelling Power Allowance and Suez and Panama Canal Tonnages, 243.

HUBBARD, M. E., The Changing Pattern of Products Demand, 85.

JELFFS, W. F., and JELFFS, P. A. M., Calibration of Tanks and Tankers, 193.

LEE, D., and O'KEEFFE, T. D., Development of the West German Chemical Industry since 1945, 219.

MUSGRAVE, F. F., Additives for Petroleum Lubricants, 105.

O'KEEFFE, T. D. *See* Lee, D.

PARKER, J. S., Random Recollections, 36, 50.

SELL, G., U.K. Petroleum Trade in 1953, 51.

THOMPSON, E. H., Ocean Transport, 165.

WEINSTEIN, M. E. *See* Appleton, A. A.

Subject Index

ABCM, 83, 147, 207-8
Absorption, 30-3
Additives, 105-9, 171
Aden, new refinery, 170, 191, 200-1
Adsorption, 79-81
Aerial ropeway, for underwater exploration, 150
AIOC continental refinery throughput, 83
Amlwch, bromine extraction plant, 139-141
Ant extermination, 231
Applied mass spectrometry, conference on, 14-16
Assam:
  drilling at Nahorkatiya, 192
  exploration, 34, 77, 104, 151
  oil industry, 248-9
ASTM:
  awards of merit, 149
  colour scale, 121
  mass spectrometry meeting, 84
  officers, 149
  Warwick Memorial Room, 149
Australia:
  exploration, 34, 60, 120, 207
  Fremantle refinery, 171
  Geelong refinery, 93
  Kurnell refinery, 103, 151
  Kwinana refinery, 76, 126, 200
Aviation gasoline, 161-2
Bahrain, 58, 147, 199
Bearing lubrication, 107
Belgium, refinery, 253
BICERA, 192
BIMCAM, 53
Bitumen, determination of asphaltenes content, 6
Books, etc.:
  AIOC *News in Pictures*, 1953, 42
  Aircraft Fuelling, 204
  ASTM/IP Petroleum Measurement Tables, 6
  Bahrain, 58
  Bahrain Petroleum Co. Ltd., Annual Report, 147
  Ball and Roller Bearing Lubrication, 101
  Bristol Engines Around the World, 204
  British Industries: Oil, 41
  British Standards Yearbook, 234
  Brush Group, Technical Journal of, 162
  BSI Annual Report, 218
  CBPME *Classified List of Equipment and Services*, 122
  Chemistry and Industry Buyers' Guide 1954, 6
  Classified List of Equipment and Services (CBMPE), 122
  Copper in Instrumentation, 99
  Corrosion Prevention and Control, 99-100
  Corrosion Technology, 100
  Dechema-Werkstoff Tabelle, 100
  Fawley, Construction of Esso Refinery, 104
  Financial Analysis of the Petroleum Industry for 1953, *U.S.A.*, 178
  Fire, References to Scientific Literature on, 218
  Goods Transport Guide, ABC, 178
  Health on the Job, A New Look at, 162
  Higher Technology, Bulletin of Special Courses in, 19
  Highly Inflammable Liquids, Code for the Storage and Use of, 99
  Instrumentation, Copper in, 99
  Iraq Oil in 1953, 180
  Italy, Review of Economic Conditions in, 204
  Kent Oil Refinery, a Technical Description of, 204
  Kent Oil Refinery: the Construction Story, 204
  Letter Symbols, Signs, and Abbreviations, BS 1991: 1954, 131
  LP Gas Sales, A Third of a Century of, 1922-52, 204
  Mellon Institute, Scientific Researches at, 1953-4, 188
  microfilm editions of IP *Journal*, 162
  Mr Petroleum, 19
  NRDC *Bulletin*, 122
  Oil and Petroleum Year Book, 254
  Oil for the World, 122
  Oils, Fats, and Waxes, 178
  Petroleum Educational Institute *Journal*, 122
  Preservation and Packaging for Export and Storage, 78
  Properties of Petroleum Products, Significance of, 178
  Register of the Gas Industry 1954, 100
  Research at Your Service (DSIR), 99
  Science and Industry—the Pattern of the Future, 204
  Some Unsolved Problems, 78
  Standard Methods, 19, 28
  Statistical Digest for 1954, Ministry of Fuel and Power, 162
  Sunbury, Research at, 188
  Tanker Handbook for Deck Officers, 58
  Tourist Trophy Races 1907-53, 19
  Tower Packings and Packed Tower Design, 164
  U.K. Petroleum Industry, Post-war Expansion of, 58
  Western Canadian Oils, 218
  Who's Who in the Gas Industry 1954, 100
  Work Study, 147
  World Road Statistics, 99
British Association, visit to Esso House, 232
British Guiana, exploration, 9
British Oil Burner Manufacturers' Association, 151, 178
Bromine extraction plant, Amlwch, 139-141
Butane-air plants, 90
Calibration of tanks and tankers, 193-8
Canadian refineries, 125
Capacitor banks, 151
Careers convention (Esso House) 233
Cathodic protection of vessels, 170
CBMPE:
  list, 122
  lunch, 217-18
Chemical engineering, 10-13, 30-3, 55-8, 79-81, 95-7, 113-17
Chemical Engineering Congress, 147
Chile, new refinery, 124
Colour standards, 121-2
Conferences:
  Applied Mass Spectrometry, 14-16
  Congress of European Federation for Chemical Engineering, 147
  Industrial Safety, 151
  International Congress of Industrial Chemistry, 252
  International Petroleum Conference in Trieste, 191
  New York. Oil Finders' Convention, 255
  Molecular spectroscopy, 209
  OEEC Symposium on Scientific Research, 251
  World Power, 171
"Constructor" vehicle, 125
Courses:
  Nottingham University, 207
  Sir John Cass College, 17, 162
Crude oil production:
  figures, 5, 28, 59, 83, 101, 117, 147, 172, 184, 208, 233
  review of, 21-6
  supply and demand, strategic aspects of, 45-7
  U.K., 83
  world statistics, 42
Detergents, 185, 235-6
Diesel engines, London buses, 131

Diesel fuels, 108
Distillation, 10-13
Docks:
  Manchester's new oil dock, 82
  Milford Haven, 151
Drilling platforms, at sea, 150, 252
Dual firing apparatus, power stations, 158, 172
Dual fuel engines, 190
Eastlake Medal, 110, 143
Electrification of refineries, 142-3
Ellesmere Port (TEL plant), 139-41
Employee relations, 144-6
Engine design, effects of fuels and lubricants, 161
Epikote resins, Stanlow plant, 150
Ethyl chloride manufacture, 140
Ethylene dibromide manufacture, 140-1
Exhibitions:
  Conquest of Desert, 18
  Electronics at Work, 233
  International Exhibition of Petroleum Industry Equipment, 209
  Oil for Britain, 251
  Photography in Industry and Commerce, 47
  Salon de la Chimie et des Matières Plastiques, 83
  Scottish Industries, 206
  The Story of Oil, 103
Exploration:
  Assam, 34, 77, 104, 151
  Australia, 34, 60, 120, 207,
  British Guiana, 9
  helicopters, use of, 150
  Mafia island (off Tanganyika), 231
  New Guinea, 44
  Nigeria, 18, 150, 206
  Papua, 152
  Persian Gulf, 190-1, 252, 253
  South China Sea, 150
  underwater, 150, 190, 252, 253
  United Kingdom:
    natural gas, 18, 84, 112
    oil, 59, 103, 170, 253
Farnborough air display, 223
FIDO, 67, 187
Films:
  accident prevention, 84
  Back of Beyond, 78, 122
  Family Album, 254
  Farming Methods—1954, 99
  Farnborough 1953, 99
  Guilty Chimneys, 254
  Handle With Care, 78
  Logbook 1953, 19
  Motor Race Marshalling, 254
  New Approach to Production Improvement, 99
  Nürburgring, 254
  Powered Flight, 41
  Power to Fly, 78
  Silverstone Saturday, 19
  Stainless Steel in Power Production, 99
  Trawlers at Spithead, 78
  You and Your Diesel, 218
Filtration, 95-7
Fire:
  Oil depot, 149
  Wave Victor, 60
Fire-fighting tender, 207
Fischer-Tropsch process, 220-1
Fuel oil:
  distribution and industrial uses in U.K., 68-70
  marine, 38
  marketing of, 125
Gas:
  bottling plant, 103
  butane-air plants, 90
  from fuel oil, 35-6, 67, 158
  solubility, 30
Gas-washing plant, efficiency of, 90
Geology, 21-6
Germany:
  chemical industry, development since 1945, 219-22
  petroleum industry, 232
Helicopters, use in exploration, 150
Honours, Birthday, 132
Hypoid gear lubrication, 107-8
IG Farben Industrie, 222
Infra-red spectra, reproduction of, 43
Insecticidal lacquer, 207
Institute of Petroleum:
  Annual Dinner, 61-7
  Birmingham Students' Branch, 89-90, 91
  colour scale, 121
  Council and officers, 111-12
  Council commentary, 5, 28, 47, 112, 137, 160, 189, 222, 240
  Eastlake Medal, 110, 143
  Economics and Operations Group, 250
  Fawley Branch, 7, 49, 71, 91, 237-8
  honorary editor, 159-60
  honorary fellowship, 110
  London Branch, 7-8, 27, 49, 91-2, 161
  monogram, 94
  Northern Branch, 27, 71, 92, 118
  Persian Gulf Branch—Bahrain, 49, 72, 199
  Persian Gulf Branch—Kuwait, 71-2, 142, 161-2, 216, 239
  Redwood medallist, 29
  Scottish Branch, 27, 49-50, 72, 92-3, 216
  South Eastern Branch, 27, 118-19, 142-3, 181-2, 239
  South Wales Branch, 8, 28, 50, 93, 216
  Stanlow Branch, 8-9, 28, 72-3, 119
  Summer Meeting, 48, 133-7
  Trinidad Branch,73, 93, 119, 161, 182-3. 216
Instrumentation, 53, 99, 113-17, 173-7
International Petroleum Conference in Trieste, 191
Inverness installation, 253
Iraq, oil production in 1953, 180
Japan, production and refining, 18
Kuwait:
  small boat harbour, 229
  students in London, 74
  tanker sailings, 170
Licensing requirements for storage of petroleum spirit, 75-6
Liquefied gases, storage of, 170
Manchester oil dock, 82
Marine fuel oils, 38
Mass spectrometry:
  ASTM meeting, 84
  IP conference, 14-16
Measurement of ships:
  gross and net tonnages, 227-9
  propelling power allowance, 243-5
  Suez and Panama Canal tonnages, 244-5
  volumetric and avoirdupois tonnages, 205
Mellon Institute, research in 1953-4, 188
Middle East production, 59
Milford Haven dock, 151
Minesweeper, coastal, 151
MIRA, testing ground opened, 146
Molecular spectroscopy, conference on, 209
Morgantown experimental station, 226
Morocco, 124
Natural gas:
  Pakistan, 102, 172
  U.K., 18, 84, 112, 158
Netherlands Antilles, Curaçao refinery, 231
Netherlands, Pernis refinery, 18
New Guinea, exploration, 44
Nigeria:
  expansion of oil facilities, 124
  exploration, 18, 150, 206
Pakistan, pipeline for natural gas, 172
Papua, exploration, 152
Performance tests of lubricants, 106-7
Persia:
  oil crisis, 22, 34
  settlement of oil dispute, 188, 242
Petroleum:
  gasoline from coal, 170
  movements by sea, 171
  production, 21-6, 42, 163
  reserves, 21-6
  shale oil, 233
  supply and demand, 45-7
  taxation on, 153-8
  tax receipts, 158
  transportation of, 171, 211-15
  U.K. consumption, 158
  Workington depot, 190
Petroleum chemicals, 170
Petroleum Consolidation Act, 1928, 75-6
Petroleum equipment exports, 59
Petroleum equipment manufacturers, European Federation, 44
Petroleum lubricants, additives for, 105-9
Petroleum products, changing demand, 85-9
Pipelines:
  Baluchistan to Karachi, 102
  Kwinana, 203
  natural gas, 102, 172
  U.S.A., 59

Plastics:
irradiation of, 9
West German production, 221
Pollution:
atmospheric, 9, 178
sea, 9, 67, 131, 187
Power stations, 158, 172
Redwood medallist, 29
Refineries:
Aden, 102, 126, 170, 191, 200-1
AIOC throughput:
continental, 83
U.K., 59
Albatros, 253
Canadian Petrofina Ltd., 125
Cardon, 231
Chile, 124
Coryton, 101, 125, 127-131, 192
Curaçao, 231
electrification of, 142-3
Fawley, 34, 103, 104, 190, 241-2
Fremantle, 171
Geelong, 93
Girard Point, 151
Grangemouth, 103, 170, 185-6, 225-6
Kent, 186-7, 204
Kurnell, 103, 151
Kwinana, 76, 126, 203
Llandarcy, 19, 185-6
Pernis, 18
Philadelphia, 50
Pumpherston, 233
Shell Haven, 171, 232
Stanlow, 124, 150, 190, 232-3, 252
U.S.A., 33
Refinery operations, effect of taxation on, 153-8
Road Bitumen Association, 170
Royal Dutch/Shell Group, 246
Safety:
ABCM Works Safety Conference, 207-8
Ardrossan record, 253
device at Coryton, 192
foot safety campaign, 184
Scottish Industries Exhibition, 206
Segas gas-from-oil-process, 35-6
Shale oil, 233
Ships, measurement of, 205, 227-9, 243-5
Silicones, West German production, 221
Solvent extraction, 55-8
South Africa, gasoline-from-coal plant, 170-1
South China Sea exploration, 150
Staff communications, 144-6
Storage of petroleum spirit, licensing requirements 75-6
Stripping, 33
Stuck pipe recovery, 183
Sulphuric acid plant (Stanlow), 232-3
Sulphur recovery, 225-6, 241
Synthetic liquid fuels, USBM policy, 81
Synthetic rubber, West German production, 221
Tank calibration, 193-6
Tankers:
AIOC new, 54
anti-rust device, 170
British Chancellor, 150
British Engineer, 34, 170
British Guardian, 34
British Oak, 28
British officer, 252
British Sergeant, 150
British Soldier, 170, 178
calibration of, 196-8
constructional, operational and safety features, 30-40
descriptive history of, 165-9
Eddyness, 151
Esso Cambridge, 102
Esso Canterbury, 83
Esso York, 231
Gluckauf, 231
Hadra, 18
Haustellum, 104
Hemifusus, 18
Hemiglypta, 253
Hunting fleet, 184
Kuwait sailings, 170
Plagiola, 190
Regent Royal, 67
Shell fleet expansion, 208
Stanvac India, 206
Tidereach, 151
Tina Onassis, 48
Wave Victor, 60
World Glory, 231
Taxation:
on hydrocarbon oils, 112
symposium on, 153-8
TEL:
exports, 59
manufacture in U.K., 139-41
Testing properties of petroleum products, 178
Tonnages, gross and net, 227-9
Trieste, International Petroleum Conference in, 191
Trinidad:
oil survey, 1952, 43
petroleum and petrochemical industries, 182-3
pitch lake, 47
United Kingdom:
Amlwch bromine extraction plant, 139-41
coal and oil consumption in steel industries, 158
Coryton refinery, 101, 125, 127-131
crude oil production, 83
detergent production, 185, 235-6
distribution and industrial use of fuel oil, 68-70
Ellesmere Port (TEL plant), 139-41
exploration:
oil, 59, 103, 170, 251
natural gas, 18, 84, 112
exports:
petroleum equipment, 59
Royal Dutch Shell Group, 124
Fawley refinery, 103, 104, 190, 241-2
fuel consumption in steel industry, 112
Grangemouth refinery, 103, 185-6, 225-6
HD oils approved, 117, 160, 208
Kent refinery, 186-7
labour statistics (refining), 147, 230, 254
Llandarcy refinery, 185-6
natural gas, 18, 84, 112, 158
oil companies' orders, 37, 148, 230
petroleum consumption, 123, 158, 198
petroleum equipment exports, 59
petroleum statistics, 42
petroleum taxation receipts, 158
petroleum trade in 1953, 51-3
prices, of coal and oil, 112
Pumpherston refinery, 233
refineries:
AIOC throughput, 59
capacity, 131
expansion, 112, 185
Shell Haven refinery, 171, 232
Stanlow refinery, 124, 150, 190, 232-3, 252
statistical digest, Ministry of Fuel and Power, 162
TEL:
exports, 59
manufacture, 139-41
United States:
ASTM, 84, 121, 149
experimental station, 226
financial analysis of petroleum industry, 178
Girard Point refinery, 151
investment in British industry, 103
Mellon Institute, research at, 188
pipelines, 59
refinery capacity, 33, 215
traffic, 36, 50
USBM, policy on synthetic liquid fuels, 81
Vehicle testing, MIRA, 146
Venezuela:
Cardon refinery, 231
electrical equipment for, 151
first oil well, 191
Weed-killing oils, duty on, 187
Well-logging, 199
White spirits, taxation on, 154
Woodstock, agricultural research station, 117
Workington depot, 190
World:
economic conditions and oil, 1-5
exploration, 21-6
oil movements by sea, 171
oil supply and demand, 45-7
production, 21-6, 42, 163
reserves, 21-6
World Petroleum Congress, 138, 172, 179, 209, 247
World Power Conference, 171

Oil is our way of life

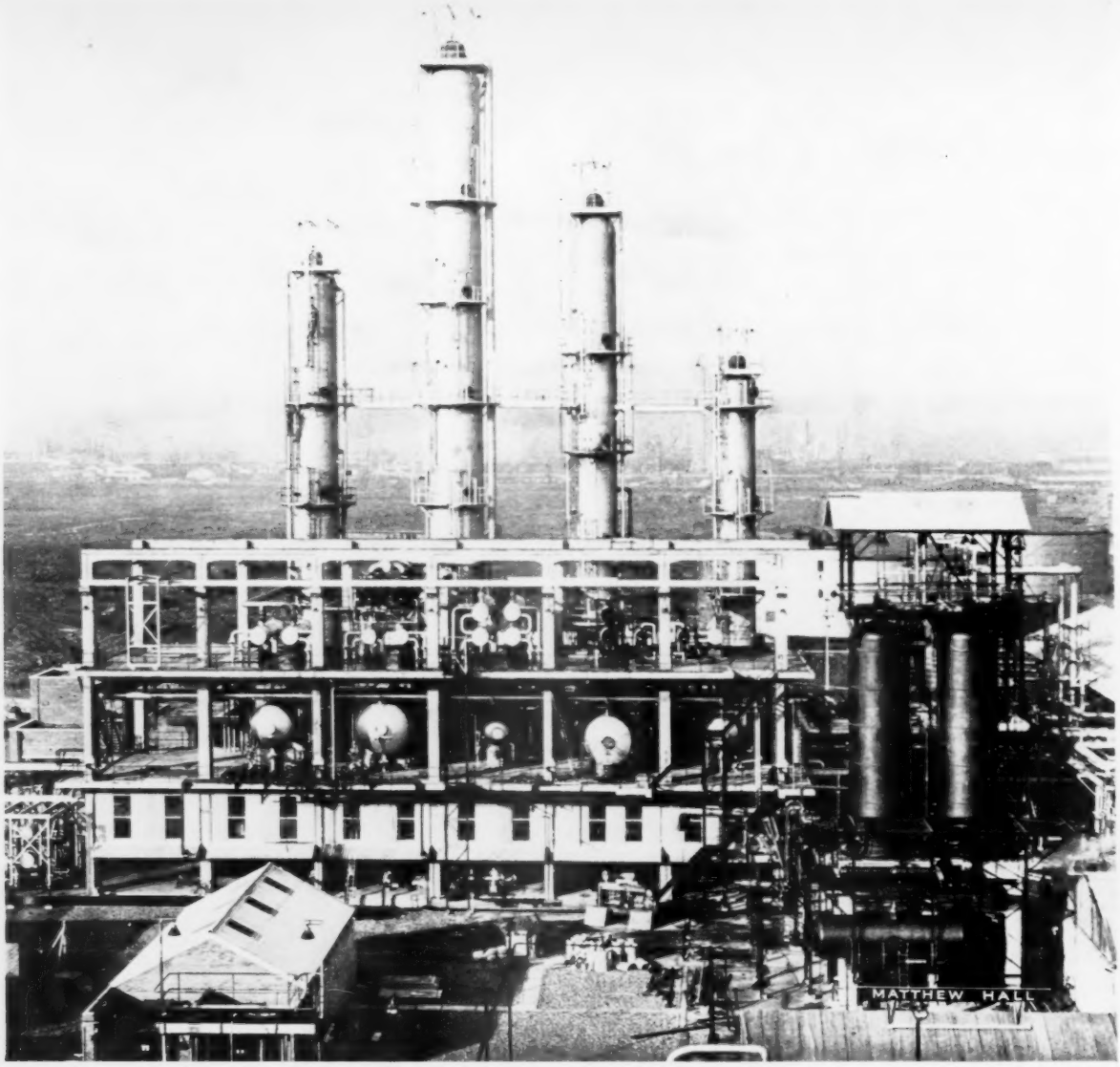
The Rev. Sydney Smith confessed that his idea of heaven was eating *pâté de foie gras* to the sound of trumpets. You yourself may be a vegetarian, and not like music with your meals. You will have your own conception of a pinnacle of happiness, a flashpoint of Better Living.

It is not for the modern Petroleum Industry to interrupt your dreams. Oil is content to go on multiplying the basic amenities of your life on this earth. It makes your transport quick and safe; it speeds the plough; it lubricates the machines of factories. Oil provides ingredients for new drugs, new materials for the modern synthetic fabrics. And oil helps in your home, too. It provides an essential ingredient for the washing powder that your wife uses. The linoleum on her kitchen floor, the fluid in which she preserves her eggs, her rubberised apron and gloves, the plastic curtains in her bathroom, even the nail-varnish on her dressing table . . . . Petroleum chemicals have been at work in their manufacture; which probably accounts for their high quality and low price. The name of SHELL may not be on them, but Shell Research stands behind them.

Petroleum in its crude form, dredged from the desert, marsh and jungle, is an unfriendly looking substance, dark, often sticky, sometimes smelly. But the products of its refinement oil the wheels of life: cleanly, smoothly and increasingly.

SHELL **research points the way**

THE SHELL PETROLEUM CO. LTD., ST. HELEN'S COURT, LONDON, E.C.3



THE

MATTHEW HALL

GROUP OF COMPANIES

ESTD. 1848

MATTHEW HALL

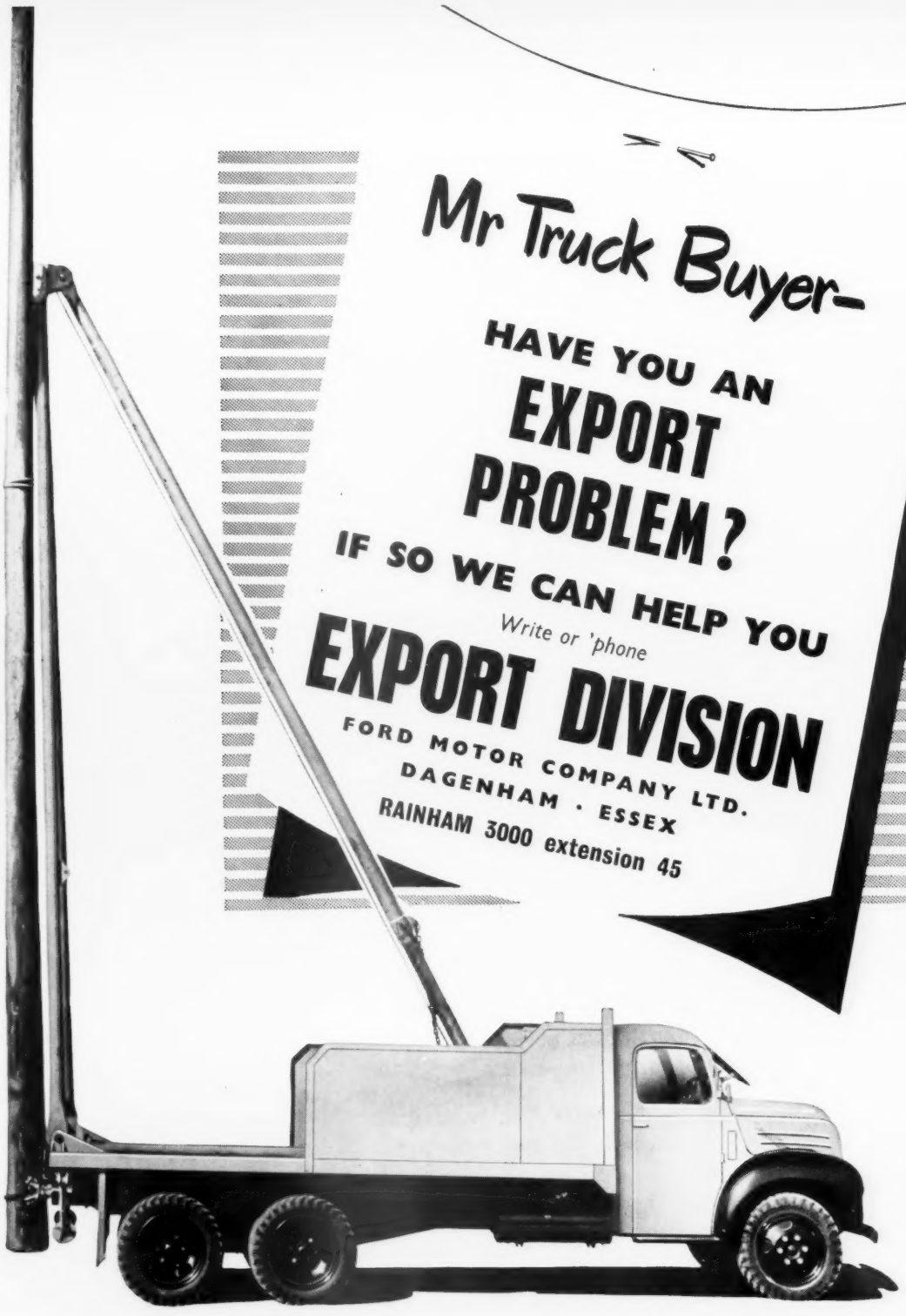
OIL REFINERY ENGINEERS

THE MATTHEW HALL GROUP OF COMPANIES

MATTHEW HALL & CO. LTD.
KELCO (METALS) LTD.

MATTHEW HALL (PTY.) LTD.
GARCHEY LTD.

LONDON . . . . . Dorset Square, N.W.1	JOHANNESBURG 52, Commissioner Street	BELFAST . . . . . Greenwood Avenue
MANCHESTER . . . . . 14, Lloyd Street	GERMISTON . . . . . Wadeville	DUBLIN . . . . . 29, Westland Row
GLASGOW . . . . . Dykehead Street, E.2	DURBAN . . . . . 100-102, Williams Road	WEST INDIES . . . . . Kingston, Jamaica
BRISTOL . . . . . St. Stephen's Street	CAPE TOWN . . . Epping Industrial Estate	BULAWAYO . . . . . Ironbridge Road
	WELKOM . . . . . Third Street	



Mr Truck Buyer—

HAVE YOU AN
EXPORT
PROBLEM?

IF SO WE CAN HELP YOU

Write or 'phone

EXPORT DIVISION

FORD MOTOR COMPANY LTD.
DAGENHAM · ESSEX
RAINHAM 3000 extension 45

Built on the famous Thames 'Sussex' chassis, this 'A' frame pole erecting equipment made by W. J. Reynolds (Motors) Ltd. is suitable for all Export requirements and is available through FORD MOTOR COMPANY LIMITED

NOW—A SPECIAL WINTER PETROL!

from Britain's newest refinery

DOUBLE POWERED

WINTER

Mobilgas

SPECIAL

• QUICKER VAPORIZING ∴ QUICKER STARTING

∴ LEAST USE OF CHOKE ∴ LESS ENGINE WEAR

∴ LONGER LIFE FOR YOUR CAR AND MORE MILES PER GALLON

—and of course, **FREEDOM FROM CARBURETTOR ICING TROUBLES**—pioneered by Mobilgas

Because the rapid vaporizing of petrol has a 'refrigerating' effect, the inside of your carburettor may be as much as 30° F. colder than the air outside. Hence ice may form in it—even on mild days, if the air is damp. No wonder many cars in Britain suffer from carburettor icing troubles such as cold stalling, or sudden power loss! An exclusive additive in Mobilgas Special controls icing troubles by preventing ice from sticking to the surfaces in your carburettor.

A TUNE-UP IN EVERY TANKFUL

☆ FOR YOUR WINTER OIL CHANGE—USE MOBILOIL ARCTIC or Mobiloil A if recommended for your engine

MASS SPECTROMETRY

A. J. B. ROBERTSON

Lecturer in Chemistry, University of London, King's College

This latest addition to Methuen's Monographs on Chemical Subjects provides a general introduction to the subject of mass spectrometry. The book gives the first account of some of the more recent experimental and theoretical studies carried out by the author at King's College, made possible by grants from the Research Fund of the University of London and the Institute of Petroleum.

With 2 plates and 26 diagrams, **8s. 6d.**

PRINCIPLES OF PETROLEUM GEOLOGY

E. N. TIRATSOO

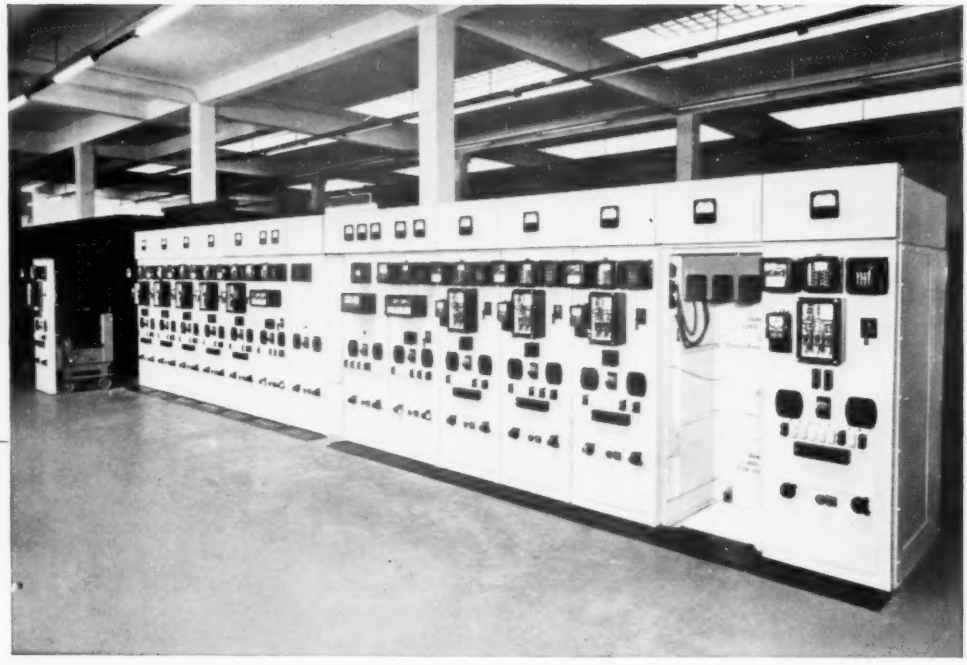
"A book that has long been awaited. It will serve as an invaluable handbook to anyone engaged in the industry."—*Shell Magazine.*

With 8 plates and 122 maps and diagrams, **42s.**

METHUEN

ADVERTISERS	PAGE
Alley & MacLellan Ltd	July
Anchor Chemical Co. Ltd	Nov.
Anglo-Iranian Oil Co. Ltd	vi
Audley Engineering Co. Ltd	Nov.
E. B. Badger & Sons Ltd	*Inside back cover*
British Thomson-Houston Co. Ltd	Nov.
W. J. Brooker Ltd.	Oct.
Causeway Reinforcement Ltd	xviii
Chemical & Insulating Co. Ltd	Aug.
Consolidated Pneumatic Tool Co. Ltd	Nov.
Thos. Cook & Son Ltd.	Nov.
A. F. Craig & Co. Ltd	ii
D. & C. and William Press Ltd	xix
Dunlop Rubber Co. Ltd	July
Elliott Bros (London) Ltd	i
English Electric Co. Ltd, The	xv
Esso Petroleum Co. Ltd.	iii
Evershed & Vignoles Ltd	iv
Fisher Governor Co. Ltd	Sept.
Foamite Ltd	Oct.
Ford Motor Co. Ltd	xiii
W. J. Fraser & Co. Ltd	x
A. Gallenkamp & Co. Ltd	Nov.
General Electric Co. Ltd, The	Nov.
Matthew Hall & Co. Ltd	xii
Incandescent Heat Co. Ltd, The	July
Johnson & Phillips Ltd	Nov.
Lake & Elliott Ltd	Nov.
Liquids Control Ltd	Nov.
London and Thames Haven Oil Wharves Ltd	v
M. & C. Switchgear Ltd	Nov.
A. & J. Main & Co. Ltd	vii
Metal Containers Ltd	*Back cover*
Metal Propellers Ltd	July
Methuen & Co. Ltd	xiv
Metropolitan-Vickers Electrical Co. Ltd	Oct.
Monsanto Chemicals Ltd	Nov.
National Benzole Co. Ltd	Nov.
Petroleum Inventions Ltd	Nov.
Piggott Bros. & Co. Ltd	vii
Regent Oil Co. Ltd	Oct.
Rubery, Owen & Co. Ltd	xvi
Sankey-Sheldon Ltd	Nov.
Serck Tubes Ltd	xvii
Shell-Mex and B.P. Ltd	ix
Shell Petroleum Co. Ltd, The	x
Simmons & Hawker Ltd	July
Sydney Smith & Sons (Nottingham) Ltd	July
Societe des Huiles De Cavel & Roegiers S.A.	Oct.
Peter Spence & Sons Ltd	Nov.
Stewarts and Lloyds Ltd	Oct.
Stothert & Pitt Ltd	Nov.
Triangle Valve Co. Ltd	July
United Steel Companies Ltd, The	xx
Vacuum Oil Co. Ltd	xiv
C. C. Wakefield & Co. Ltd	viii
Walsall Conduits Ltd	July
Wickham Industrial Equipment Ltd	viii
Woodfield Hoist and Associated Industries Ltd	July

Air circuit breakers for Oil Refineries



A 3,300 volt type OB33L switchboard similar to the one illustrated has been manufactured for Messrs. Foster Wheeler Ltd., for ultimate delivery to the Standard Vacuum Oil Refinery in Durban, South Africa.

Switchboards are being supplied incorporating a total of 30 type OB33L air circuit breakers with breaking capacities of 150 MVA specially suitable for motor control.

'ENGLISH ELECTRIC'

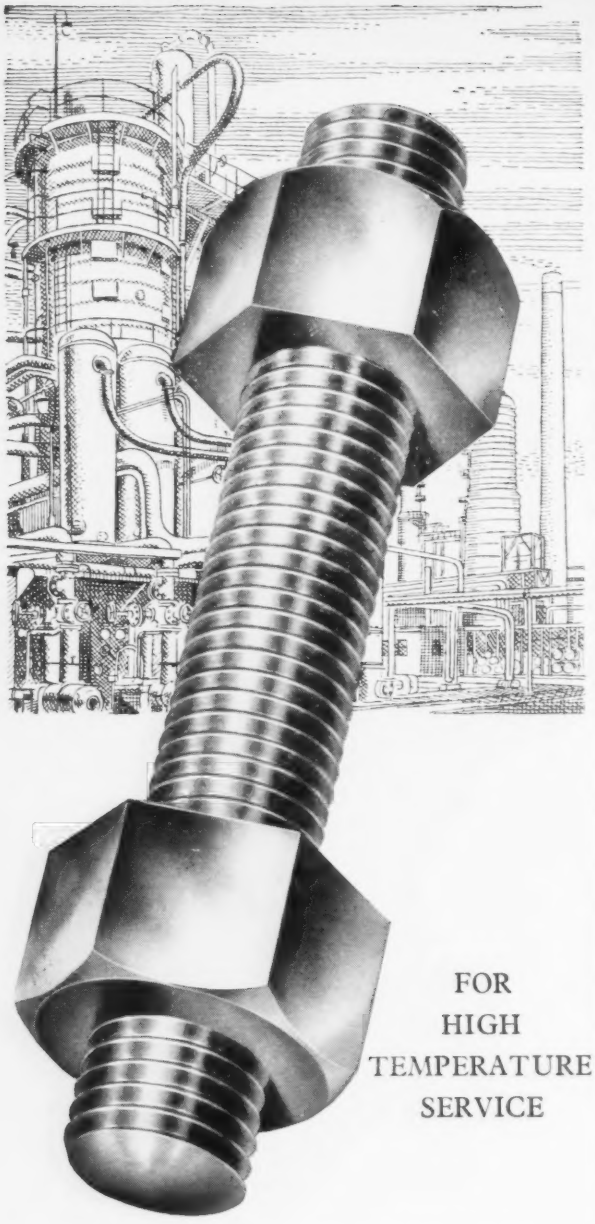
switchgear

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Switchgear Department, Liverpool

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

S.L. 13



FOR
HIGH
TEMPERATURE
SERVICE

Conforming to B.S.S. 1750-1951, Stud Bolts and Nuts are being supplied by Rubery Owen to all the principal Oil Companies and Refinery Equipment Manufacturers in ever increasing quantities. Special production facilities have been planned to suit every requirement to both British and American Standards with either Unified or Whitworth Threads.

RUBERY OWEN

STUD BOLTS AND NUTS

RUBERY, OWEN & CO., LIMITED
DARLASTON, SOUTH STAFFS., ENGLAND

Member of the Owen Organisation

London Export Department: Kent House, Market Place, Oxford Circus, W.1
Canadian Office: 1470 The Queensway, Postal Station N Toronto, 14

Significance of Properties of Petroleum Products

A guide to the meaning to be placed on the figures obtained as the result of submitting a petroleum product to a standard test.

74 pages

Price **7s. 6d.** post free

Obtainable from

The Institute of Petroleum
26 Portland Place, London, W.1

STANDARD METHODS
FOR
TESTING PETROLEUM
AND
ITS PRODUCTS

(THIRTEENTH EDITION-1953)

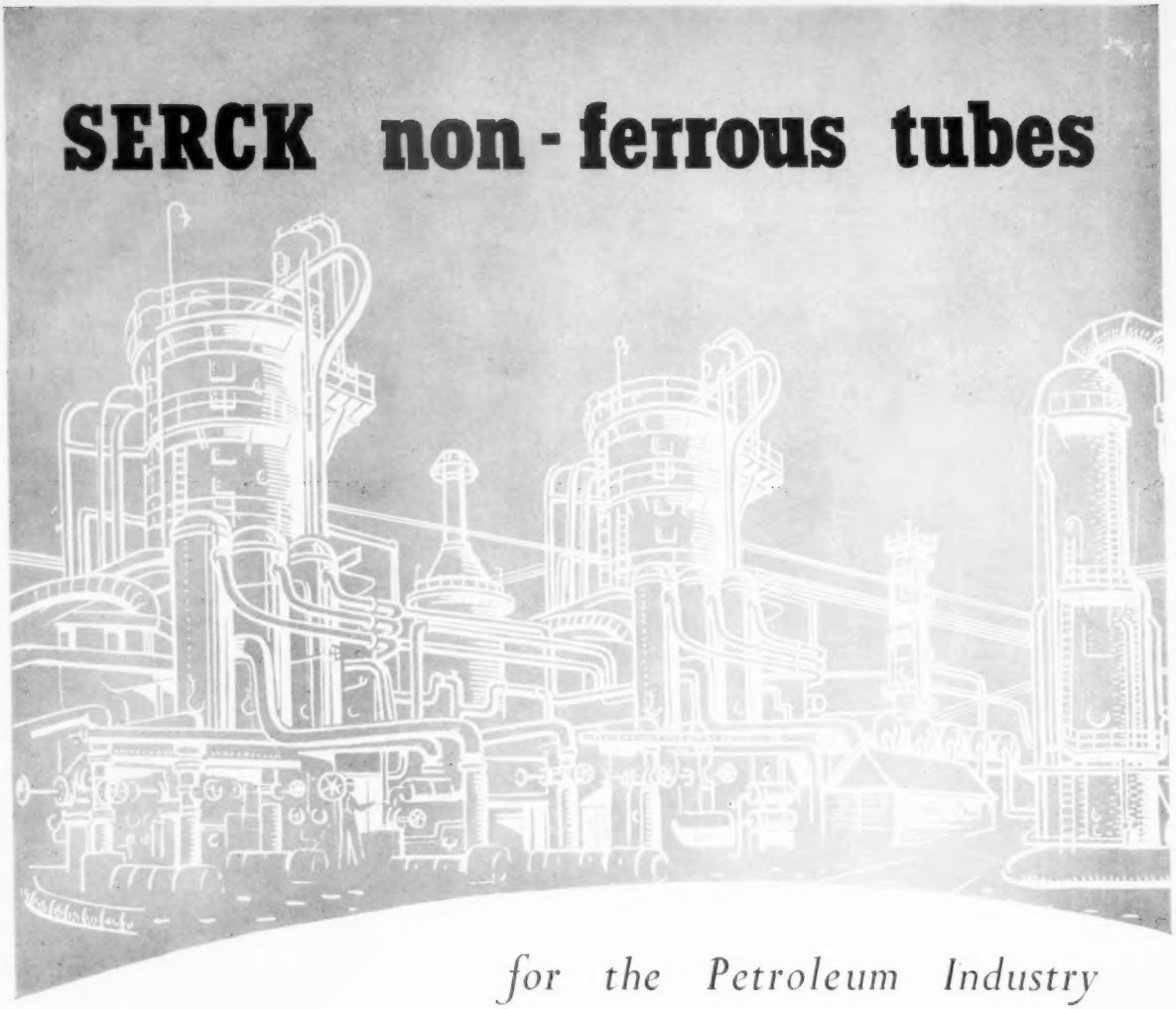
755 pages 168 Diagrams

Price 40s. post free

Obtainable from

The Institute of Petroleum
26 Portland Place, London, W.1

SERCK non-ferrous tubes



for the Petroleum Industry

With the expansion of foundry facilities by the installation of the latest induction melting plant, the development of a specialised vertical extrusion process and the recent completion of a new tube mill—one of the largest and most up-to-date of its kind in this country today—Serck are able to offer a greatly increased tonnage of non-ferrous tubes.

The range of tubes includes 70 30, Admiralty brass, Aluminium bronze, aluminium brass and cupro-nickel made to British, American or other accepted specifications. The alloys are compounded to give the highest resistance to corrosion and eliminate de-zincification. Also every tube is individually tested hydraulically to 1,000 lb sq. in. or higher pressures as specified.

Stringent laboratory tests, rigid supervision throughout all stages of manufacture, and heat treatment in a controlled atmosphere ensure that Serck tubes will give long, trouble-free service.

Serck technical advisory service is always ready to help you select the tube best suited to your requirements.

SERCK TUBES LIMITED . BIRMINGHAM 11

CORROSION PROBLEMS IN REFINERIES

CAN BE MET BY FITTING

"CAUSEWAY"

"HEXAGON STEEL"

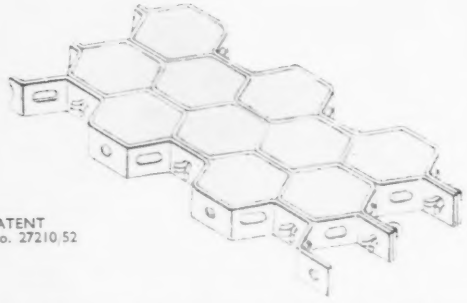
CELLULAR REINFORCEMENT LININGS

WITH CELL LOADINGS OF REFRACTORIES OR CEMENTS

Causeway Linings may be supplied in Carbon Steel, Stainless, or Monel Metal

---

A LIGHT-WEIGHT LOADED MONEL METAL MESH CAN BE LESS COSTLY THAN A SOLID MONEL METAL LINER IN CERTAIN APPLICATIONS

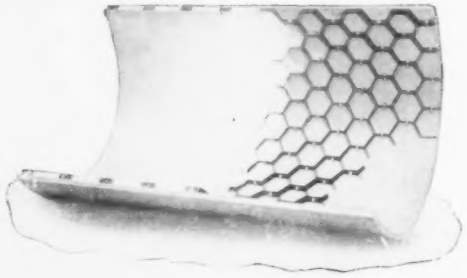


PATENT
No. 27210/52

Note the Slotted Side Walls and Keying Devices which ensure complete immunity against dislodgement of the cement even under the most severe conditions. Several patented variations of the Keying methods are available to suit varying conditions.

Mats are made up in a Wide Range of Sizes, Hex Pitch or Depth, either rivetted as rigid members or having a flexibility to suit any radius from eight inches upwards.

A special Two Way Flexible construction is available for Domed Roofs and Flumed Channels.



Causeway Reinforcement Ltd.

66 VICTORIA STREET, LONDON S.W.1

TELEPHONE VICTORIA 8648 and 1873

The Post-War Expansion of the U.K. Petroleum Industry

Being the full report of the 1953 Summer Meeting of The Institute of Petroleum

220 pages Illustrated

Price **25s. 0d.** post free

Obtainable from

The Institute of Petroleum

26 Portland Place, London, W.1.

DRILLING MUD:

ITS MANUFACTURE AND TESTING

By

P. EVANS and A. REID

Reprinted from Transactions of the Mining and Geological Institute of India, 1936

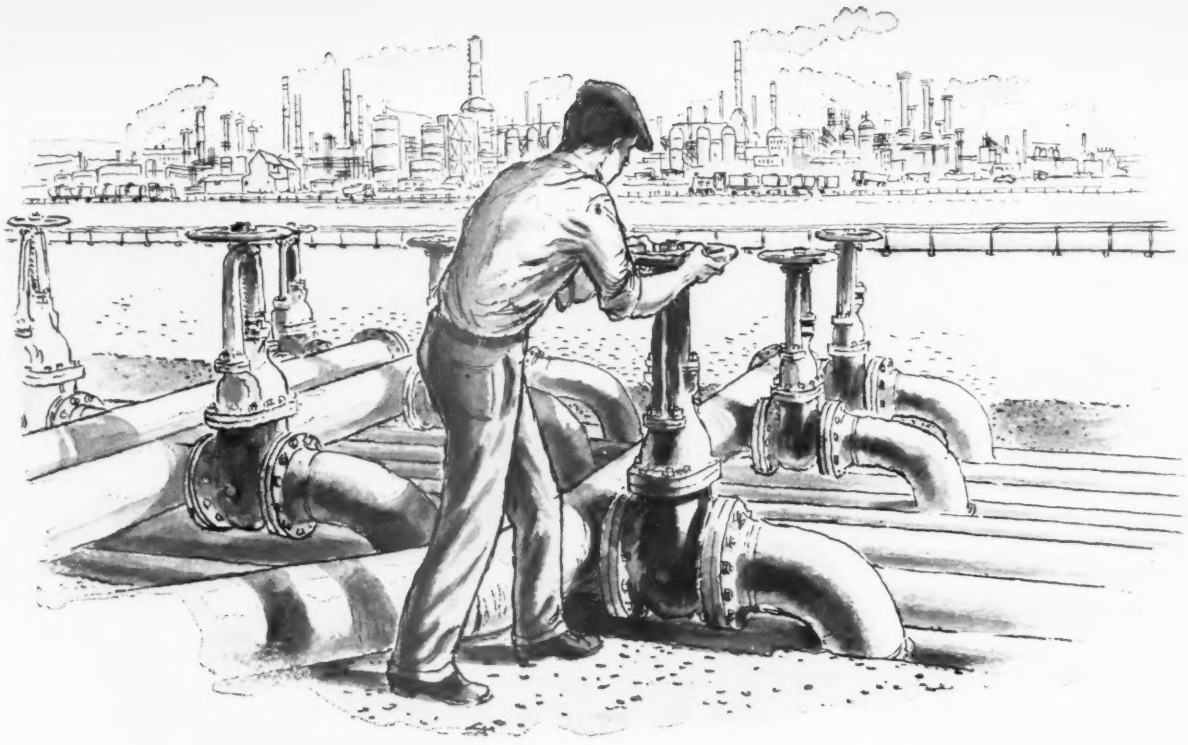
Pages 263 + xxx. Paper covers

Price 21s. post free

Obtainable from

The Institute of Petroleum

26 Portland Place, London, W.1



Speeding the flow

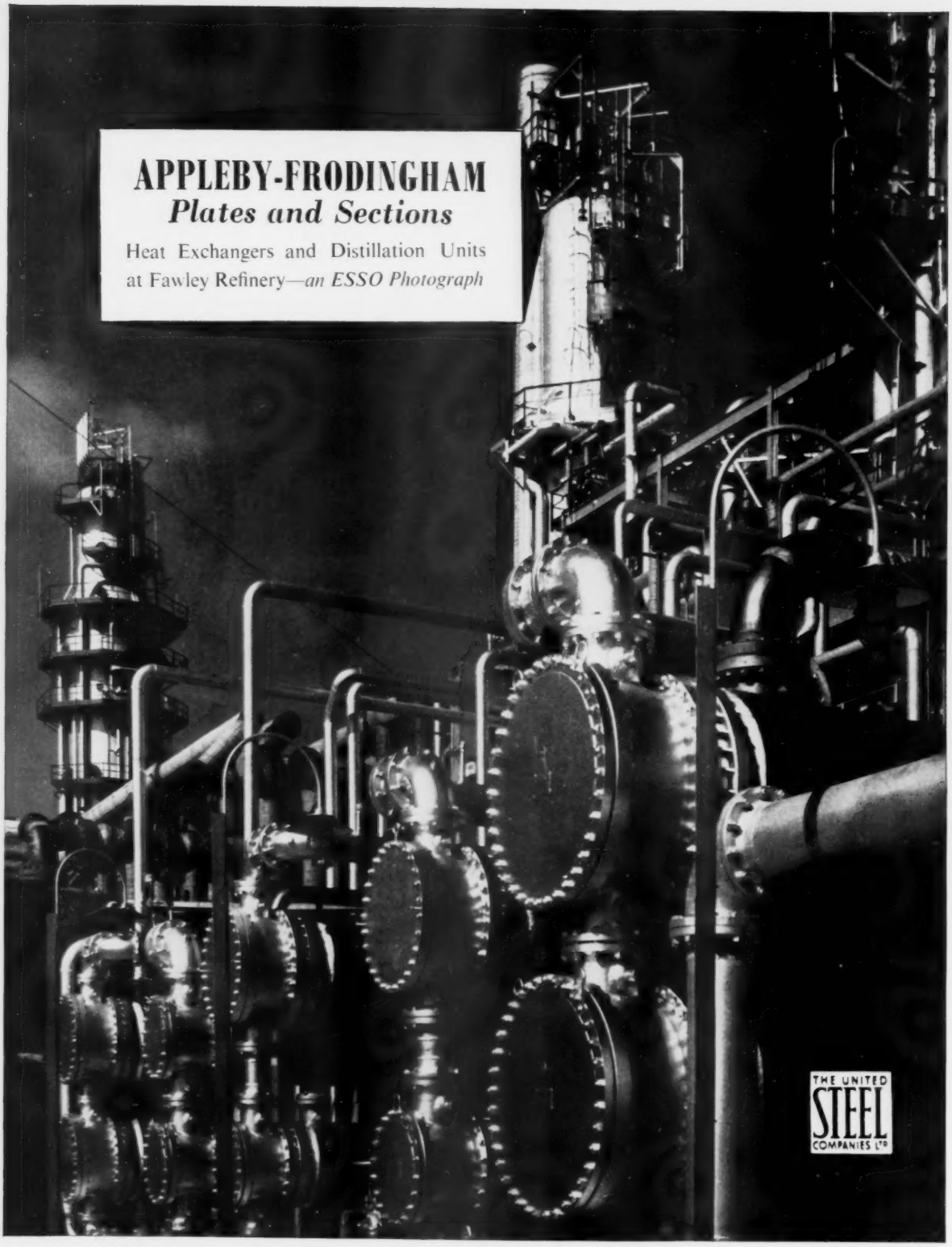
When the flow of oil must wait for the erection of new plant, the degree of skill and resource brought to the work of construction is a major economic factor. For this skill there is no firm grounding other than wide, first-hand, practical experience of process engineering for petroleum and petrochemicals, of the kind possessed by D. & C. and William Press Ltd.

D & C
AND WM.
PRESS
LTD.

civil, mechanical and chemical construction engineers at home and abroad

Head Office : **27, ASHLEY PLACE, LONDON, S.W.1.** Tel : VICtoria 9751 (6 lines) 'Grams : Demcopress, London

TA6605



APPLEBY-FRODINGHAM STEEL COMPANY

SCUNTHORPE *Branch of The United Steel Companies Limited* LINCS

Telephone: Scunthorpe 3411 (9 *lines*) *Telegrams: 'Appfrod' Scunthorpe*

Round the World with BADGER . . .

In all four corners of the world Badger-built plants are turning out quality products for the Petroleum, Chemical, and Petro-chemical industries. Badger, with its completely integrated specialist organization, offers a step by step service from the basic design to the finished plant based on a sure foundation of knowledge and experience.

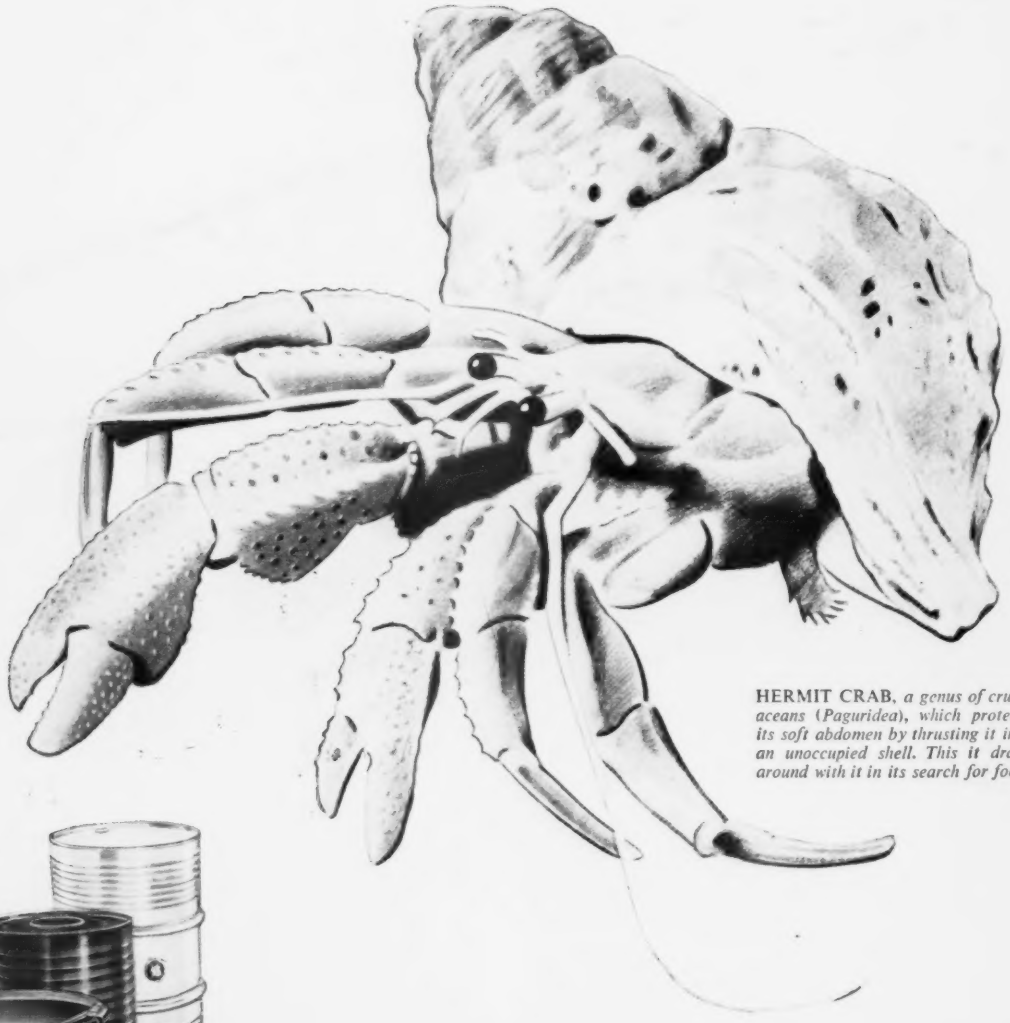
E. B. BADGER & SONS LIMITED

99, ALDWYCH, LONDON, W.C.2

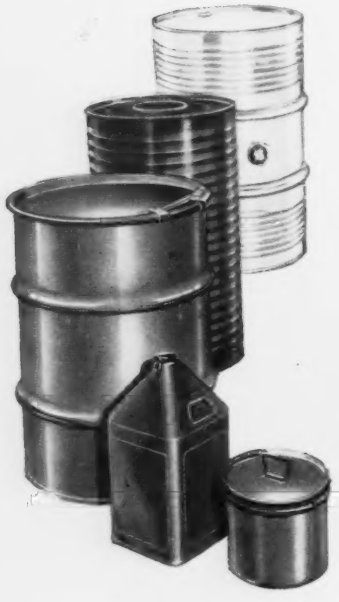
Process Engineers and Constructors for the Petroleum, Chemical and Petro-Chemical Industries

Affiliated with STONE & WEBSTER ENGINEERING CORPORATION, Badger Process Division, U.S.A.

SAFE IN THE RIGHT CONTAINER



HERMIT CRAB, *a genus of crustaceans (Paguridea), which protects its soft abdomen by thrusting it into an unoccupied shell. This it drags around with it in its search for food.*



YOUR PRODUCTS ARE PROTECTED BY

METAL CONTAINERS

FOR SAFETY IN TRANSIT

METAL CONTAINERS LTD., 17 WATERLOO PLACE, PALL MALL, LONDON

WORKS: ELLESMERE PORT & RENFREW. ASSOCIATED COMPANIES OVERSEAS

M-W.108